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Analog Science Fact—fiction

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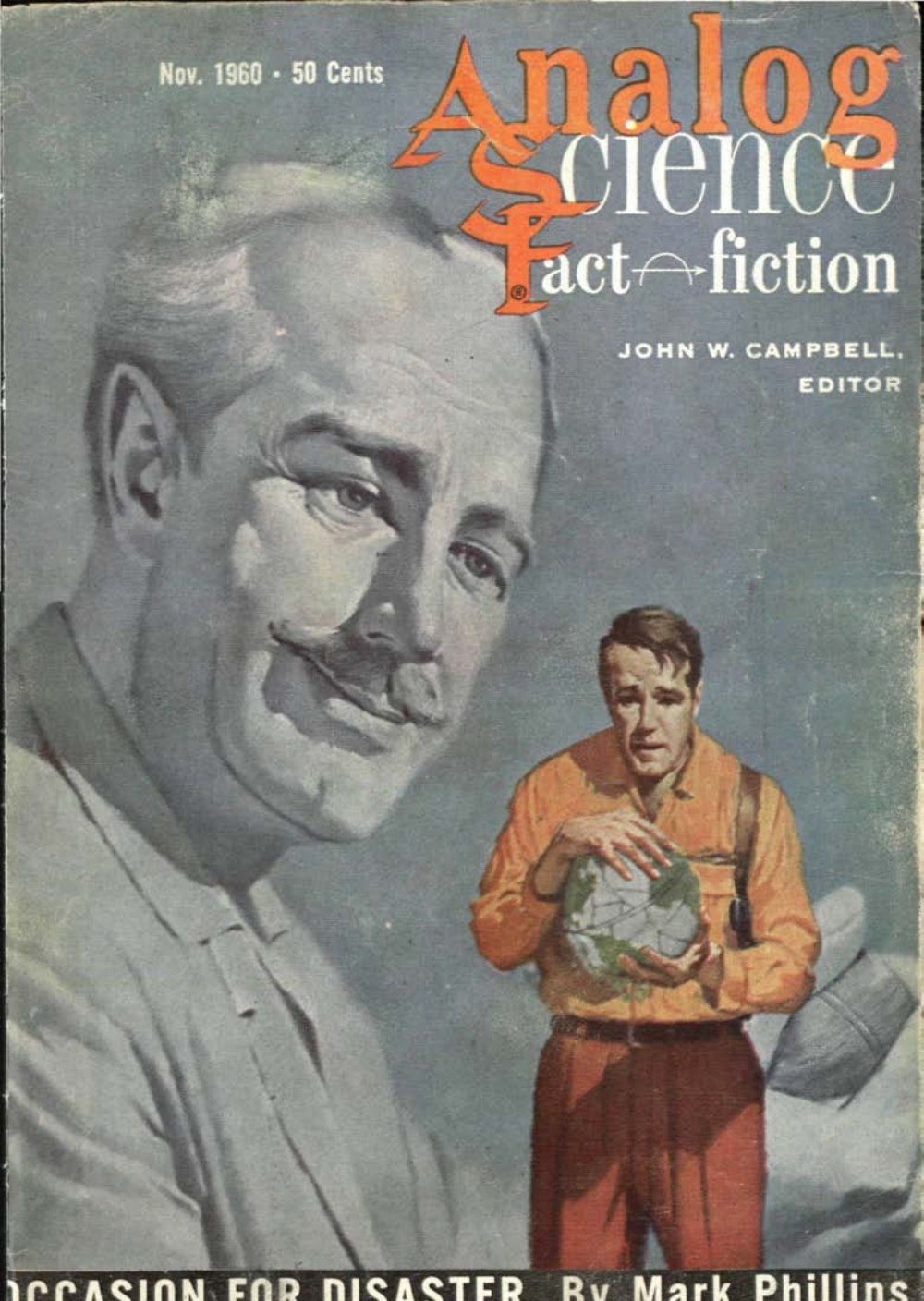

OCCASION FOR DISASTER, By Mark Phillips

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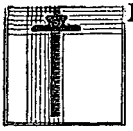
EDITORIAL

THE LITERAL-MINDED TYPE



THE only true, mental faculty that we can teach, so far, is Logic; we can *train* certain other mental faculties—memory, for one—but we cannot *teach* memory or other mental faculties, because we don't know how they function in the first place.

We can train a man to be a better observer—but we can't truly teach the ability to recognize patterns. Training improves the ability of a woodsman to follow game, or to spot danger—but true teaching has relatively little to do with it. At root, the problem is that we can't define, in communicable words, what a pattern is. If I wanted to warn the next guy of the danger of a Martian *zglyche,* it would be impossible to do so if he'd never experienced seeing-a-*zglyche,* and there were no analogous pattern-of-seeing already in our mutual experiences. We can't define a pattern in terms of the nature of patternness —but only by analogy.

Most of our sensory patterns are far less communicable, actually, than those of sight, even. Try telling someone who's never tasted one what a sweet green pepper "tastes like," for instance. And note that the normal English usage is "tastes *like,*" not "how it tastes."

We can communicate and therefore can teach Logic—which is an immense achievement. The achievement of air-borne flight was a great achievement, too—but space-flight is an entirely different thing, with vastly greater connotations. We're as helpless to teach intuition, right now, as we are at interstellar flight.

Yet intuition is the mental faculty from which logic must proceed. Logic, remember, is a process of manipulating axioms or postulates according to rules—and the rules are, of course, simply another set of axioms! And axioms are "things which are intuitively true."

Anyone who's ever tried arguing with a true "computing psychotic" paranoid will have learned, in a permanently unforgettable manner, that Logic is a poor tool indeed, of little worth or value, in communicating

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with another human being. It cannot affect a postulate; it cannot prove or disprove, generate or destroy, any postulate. The most Logic can do is to manipulate one postulate into conflict with another; it's then up to the postulates to come to conclusions. I can render all your logical efforts utterly futile if I insert as a basic postulate, "All the statements you make all lies intended to deceive me."

Just try Logicking your way through, around, under, over, or past that postulate!

If you ever do run into the situation of trying to communicate with a red-hot paranoid, you'll be faced with precisely that problem. Logic, my friend, will get you absolutely nowhere.

And you don't know anything whatever about the nature of the process of intuition, or postulate-generation, so you're positively and absolutely helpless.

I am *not* saying that Logic is useless; I am saying that it's inherently limited. Chemistry cannot, and never will be able to, cause a nuclear reaction; nuclear forces belong to a different order of effects. Chemistry can never analyze the substance of a magnetic field, either. Chemistry is a wonderful tool . . . for its proper work. But it's as useless as a sledge hammer for fixing a watch, when it comes to force-field analysis. As futile as Logic for fixing a short-circuited postulate.

At the time I'm writing, the Congolese are busily demonstrating a number of logical results of improperly framed postulates of modern political philosophy. They have just gained their political independence; they are now citizens of a popular democracy. And since their training in postulate-analysis is inadequate, they are behaving in a strictly, literal-minded logical way. They're behaving in exactly the fashion experienced, wise observers of the situation had predicted—and rather violently contrary to the predictions of the sentimentalists of the sob-sister school of democracy.

I mentioned a few months ago that the White and Negro leaders in South Africa were in violent conflict on most points, but were in perfectly unanimous agreement on one: neither White nor Black leaders have the faintest desire to permit a true, perfectly honest popular-democracy vote of the entire population. Both groups know perfectly well who'd win; as I said, it would be the Mau-Mau spirit that would win.

The Congo demonstrates the point. The Congolese, as of this moment, are carrying out quite effectively the program the Mau-Mau were seeking to implement. They are driving out the whites, raping and murdering freely in the process, and overthrowing all signs, symbols, and/or mechanisms of organization at any level broader than the tribal level. The various tribes are, moreover, happily taking up their long-interrupted and suppressed mutual-murder campaigns, approximately where they were stopped by the oppression of the White conquerors.

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The Negro leaders in the Congo Republic are doing everything in their power—which is inadequate, of course—to establish some reasonable order out of the suddenly exploding chaos. Those leaders have been suffering from the unfortunate delusion that, because they are Negro, and do understand the validity of the cultural postulates of civilization, their fellow Negroes must also.

As experienced observers on the scene have been reporting for quite some time, with nearly perfect unanimity, " the people are not ready for self-government."

They aren't, as they are very clearly and conclusively demonstrating. They aren't going to have it, either; self-government is something that simply cannot, ever, be given to any people. The Belgians were governing them; the Belgians withdrew . . . but that didn't mean that, automatically, the Congolese had self-government. Before there can be *self*-government, there must be *government*; popular democracy isn't government among the Congolese people. Therefore it can't be self-government.

Judging from history—some six thousand years of history—it is apt to take several generations, and quite a few dozens of millions of deaths-by-violence before the people are ready for self-government. Unless, of course, somewhere, somehow, somebody comes up with a method of *teaching* intuition, the Science of Postulate Generation and Evaluation.

As of now, if a man has a postulate such as "Everything you say is a lie, intended to deceive and exploit me!" there is no way of getting that postulate out of his motivation system. The only known method of removing that postulate from the local scene is by removing the man who has it. We usually try to lock such people away where they don't gum up the works of the culture; in a culture with a smaller surplus productive capacity, and a larger number of destructive-postulate-carriers, the normal method is to kill the carrier. You can expect that process to be applied very widely in Africa for the next few generations.

Unless somebody finds some workable method of teaching Intuition.

The Congo Republic's current trouble stems from the false postulates that have been planted in their people by the sentimentalist, sob-sister school of popular democracy. The postulates are:

1. Free men have a right to make up their minds for themselves as to how they shall live and act.

2. Free men should not submit to commanding orders from anyone.

3. In a true democracy, everyone is equal.

The events in the Congo are the exact, literal logical application of those precise principles. Those ideas have been planted in the minds of people who have not been trained, over several generations, to evaluate postulates, and recognize the irrational, but logical, consequences of literal interpretation of badly stated postulates.

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Consider the exact, and literal-minded interpretation of Postulate #1 up there, for instance. If it is true that since I am now a free citizen of an independent democracy, then I am a free man. I have a right to make up my own mind as to what I shall do. There is a woman I have wanted to take; heretofore it has been illegal, because I was not a free man. Now I am a free man, and I have a proper right to act as I choose. I will rape her, for it is now right and proper for me to do so. Q.E.D.

And if you don't like it, bub, it's your own postulate developed, with literal-minded logic, to direct action.

Next time, try doing a bit better job of stating your postulate in terms that a literal-minded logical man won't misapply. And when you're framing the postulate remember that you must get across such sophisticated concepts as the license attending all freedoms mentioned in the Bill of Rights, the restraints on the use of one's own real property—still described in common law medieval Latin *sic utere tuo ut alienum non laedas*—or the hair-line distinctions between felonies and misdemeanors.

Don't load all the blame on the local yokel who lacks several generations of conditioning to help him make sense out of your sloppy statements! Just because you don't like the results of what you said does'nt mean it isn't exactly what you said!

Now Postulate #2 there leads to some of the other Alice-in-Wonderland logic-gone-irrational things that are happening. As I pointed out in the discussion on the Big Help, there can be no culture without Prejudice (a system of standards of behavior), Discrimination (a system of courts to distinguish between those who do, and those who do not comply with the standards), and Hurt, the police power. Without police power, the others may exist, but they're disembodied spirits, moaning their misery through empty government buildings; they might as well not exist, and let the men go do something useful for a living, like beating the looters away from their own homes.

Postulate #2 brought a tragi-comic result as soon as the Congo Republic became free. Free men should not take orders from anyone. Literal-minded logicians that they were, the Congolese militia, on which the police power of the new government rested, rejected the officers' orders. Logical, isn't it? As soon as the Congo was free, then, logically, they were free men, and free men don't take orders from officers. That's what you said, wasn't it? Of course they were a well-disciplined force *before* the Congo was free; it was improper for a non-free soldier to reject an officer's command. But when they became free, it was immediately, logically, improper to accept those commands. Q.E.D.

And they proceeded forthwith to *demonstrandum* the effect, but good. Which left the new Congo government *sans* police force. Naturally. Perfectly logical. Sure the *result* is irrational—but *the logic is not.*

(Continued on page 176)

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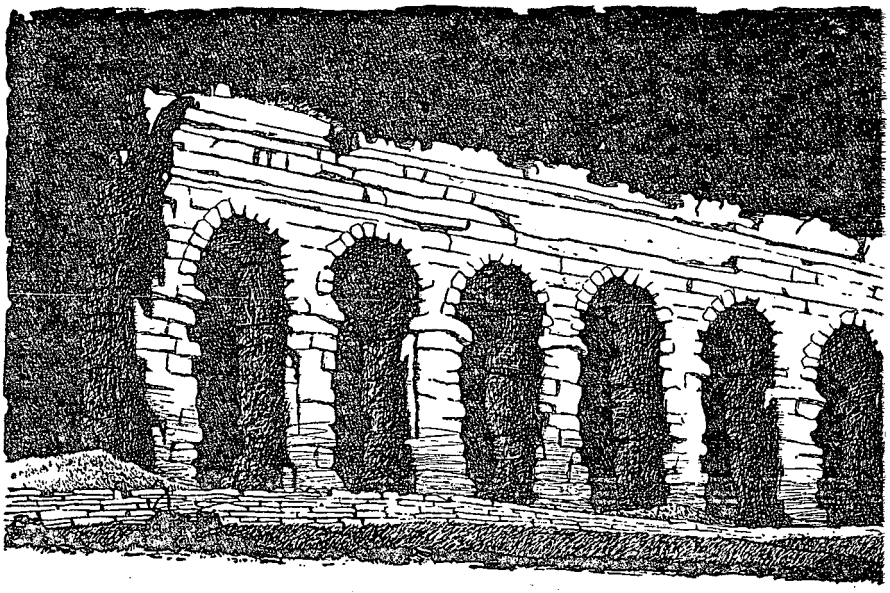

Illustrated by van Dongen

OCCASION.

First of Four Parts. A very small slip, at just the wrong place, can devastate any enterprise. One tiny transistor can go wrong . . . and ruin a multi-million dollar missile. Which would be one way to stop the missiles . . .

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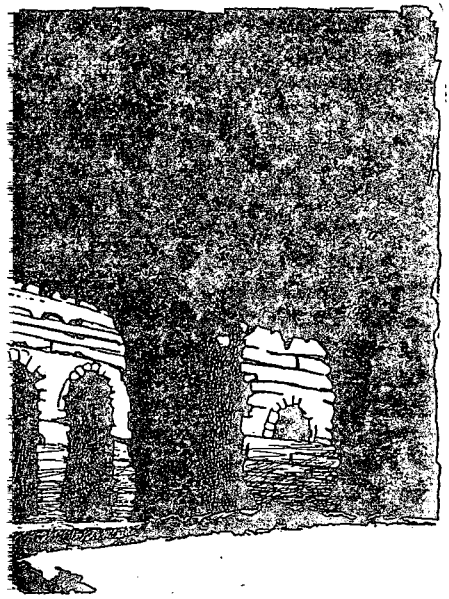

. for DISASTER

By MARK PHILLIPS

"We must remember not to judge any public servant by any one act, and especially should we beware of attacking the men who are merely the occasions and not the causes of disaster."

Theodore Roosevelt

IN 1914, it was enemy aliens.

In 1930, it was Wobblies.

In 1957, it was fellow-travelers.

In 1971, it was insane telepaths.

And, in 1973:

"We don't know *what* it is," said Andrew J. Burris, Director of the FBI. He threw his hands in the air and looked baffled and confused.

Kenneth J. Malone tried to appear sympathetic. "What what is?"

Burris frowned and drummed his fingers on his big desk. "Malone," he said, "make sense. And don't stutter."

"Stutter?" Malone said. "You said you didn't know what it was. And I wanted to know what it was."

"That's just it," Burris said. "I don't know."

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Malone sighed and repressed an impulse to scream. "Now, wait a minute, Chief—" he started.

Burris frowned again. "Don't call me Chief," he said.

Malone nodded, "O.K.," he said. "But—if you don't know what it is, you must have some idea of what you don't know. I mean, is it larger than a breadbox? Does it perform helpful tasks? Is it self-employed?"

"Malone," Burris sighed, "you ought to be on television."

"But—"

"Let me explain," Burris said. His voice was calmer now, and he spoke as if he were enunciating nothing but the most obvious and eternal truths. "The country," he said, "is going to Hell in a handbasket."

Malone nodded again. "Well, after all, Chief—" he started.

"Don't call me Chief," Burris said wearily.

"Anything you say," Malone agreed peacefully. He eyed the Director of the FBI warily. "After all, it isn't anything new," he went on. "The country's always been going to Hell in a handbasket, one way or another. Look at Rome."

"Rome?" Burris said.

"Sure," Malone said. "Rome was always going to Hell in a handbasket, and finally it—" He paused. "Finally it did, I guess," he said.

"Exactly," Burris said. "And so are we. Finally." He passed a hand over his forehead and stared past Malone at a spot on the wall. Malone turned and looked at the spot, but saw nothing of interest. "Malone," Burris said, and the FBI Agent whirled around again.

"Yes, Ch—Yes?" he said.

"This time," Burris said, "it isn't the same old story at all. This time it's different."

"Different?" Malone said.

Burris nodded. "Look at it this way," he said. His eyes returned to the FBI Agent. "Suppose you're a congressman," he went on, "and you find evidence of inefficiency in the government."

"All right," Malone said agreeably. He had the feeling that if he waited around a little while everything would make sense, and he was willing to wait. After all, he wasn't on assignment at the moment, and there was nothing pressing waiting for him. He was even between romances.

If he waited long enough, he told himself, Andrew J. Burris might say something worth hearing. He looked attentive and eager. He considered leaning over the desk a little, to look even more eager, but decided against it; Burris might think he looked threatening. There was no telling.

"You're a congressman," Burris said, "and the government is inefficient. You find evidence of it. What do you do?"

Malone blinked and thought for a second. It didn't take any longer than that to come up with the old, old answer. "I start an investigation," he said. "I get a committee and I talk to a lot of newspaper editors and magazine editors and maybe I go on television and talk some more, and my

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committee has a lot of meetings—"

"Exactly," Burris said.

"And we talk a lot at the meetings," Malone went on, carried away, "and get a lot of publicity, and we subpoena famous people, just as famous as we can get, except governors or presidents, because you can't—they tried that back in the '50s, and it didn't work very well—and that gives us some more publicity, and then when we have all the publicity we can possibly get—"

"You stop," Burris said hurriedly.

"That's right," Malone said. "We stop. And that's what I'd do."

"Of course, the problem of inefficiency is left exactly where it always was," Burris said. "Nothing's been done about it."

"Naturally," Malone said. "But think of all the lovely publicity. And all the nice talk. And the subpoenas and committees and everything."

"Sure," Burris said wearily. "It's happened a thousand times. But, Malone, that's the difference. It isn't happening this time."

There was a short pause. "What do you mean?" Malone said at last.

"This time," Burris said, in a tone that sounded almost awed, "they want to keep it a secret."

"A secret?" Malone said, blinking. "But that's . . . that's not the American way."

Burris shrugged. "It's un-congressman-like, anyhow," he said. "But that's what they've done. Tiptoed over to me and whispered softly that the thing has to be investigated quietly. Naturally, they didn't give me any orders—but only because they know they can't make one stick. They suggested it pretty strongly."

"Any reasons?" Malone said. The whole idea interested him strangely. It was odd—and he found himself almost liking odd cases, lately. That is, he amended hurriedly, if they didn't get *too* odd.

"Oh, they had reasons, all right," Burris said. "It took a little coaxing, but I managed to pry some loose. You see, every one of them found inefficiency in his own department. And every one knows that other men are investigating inefficiency."

"Oh," Malone said.

"That's right," Burris said. "Every one of them came to me to get me to prove that the goof-ups in his particular department weren't his fault. That covers them in case one of the others happens to light into the department."

"Well, it must be *somebody's* fault," Malone said.

"It isn't theirs," Burris said wearily. "I ought to know. They told me. At great length, Malone."

Malone felt a stab of honest pity. "How many so far?" he said.

"Six," Burris said. "Four representatives, and two senators."

"Only two?" Malone said.

"Well," Burris said, "the Senate is so much smaller. And, besides, we may get more. As a matter of fact, Senator Lefferts is worth any six representatives all by himself."

"He is?" Malone said, puzzled. Senator Lefferts was not one of his favorite people. Nor, as far as he

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knew, did the somewhat excitable senator hold any place of honor in the heart of Andrew J. Burris.

"I mean his story," Burris said. "I've never heard anything like it—at least, not since the Bilbo days. And I've only heard about those," he added hurriedly.

"What story?" Malone said. "He talked about inefficiency—"

"Not exactly," Burris said carefully. "He said that somebody was out to get him—him, personally. He said somebody was trying to discredit him by sabotaging all his legislative plans."

"Well," Malone said, feeling that some comment was called for, "three cheers."

"That isn't the point," Burris snapped. "No matter how we felt about Senator Lefferts or his legislative plans, we're sworn to protect him. And he says 'they' are out to get him."

"They?" Malone said.

"You know," Burris said, shrugging "The great 'they.' The invisible enemies all around, working against him."

"Oh," Malone said. "Paranoid?" He had always thought Senator Lefferts was slightly on the batty side, and the idea of real paranoia didn't come as too much of a surprise. After all, when a man was batty to start out with . . . and he even *looked* like a vampire, Malone thought confusedly.

"As far as paranoia is concerned," Burris said, "I checked with one of our own psych men, and he'll back it up. Lefferts has definite paranoid tendencies, he says."

Malone said, "That's that."

Burris shook his head. "It isn't that simple," he said. "You see, Malone, there's some evidence that somebody *is* working against him."

"The American public, with any luck at all," Malone said.

"No," Burris said. "An enemy. Somebody sabotaging his plans. Really."

Malone shook his head. "You're crazy," he said.

Burris looked shocked. "Malone, I'm the Director of the FBI," he said. "And if you insist on being disrespectful—"

"Sorry," Malone murmured. "But —"

"I am perfectly sane," Burris said slowly. "It's Senator Lefferts who's crazy. The only trouble is, he has evidence to show he's not."

Malone thought about odd cases, and suddenly wished he were somewere else. Anywhere else. This one showed sudden signs of developing into something positively bizarre. "I see," he said, wondering if he did.

"After all," Burris said, in a voice that attempted to sound reasonable, "a paranoid has just as much right to be persecuted as anybody else, doesn't he?"

"Sure," Malone said. "Everybody has rights. But what do you want me to do about that?"

"About their rights?" Burris said. "Nothing, Malone. Nothing."

"I mean," Malone said patiently, "about whatever it is that's going on."

Burris took a deep breath. His hands clasped behind his head, and he looked up at the ceiling. He

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seemed perfectly relaxed. That, Malone knew, was a bad sign. It meant that there was a dirty job coming, a job nobody wanted to do, and one Burris was determined to pass off on him. He sighed and tried to feel resigned.

"Well," the FBI Director said, "the only actual trouble we can pinpoint is that there seem to be a great many errors occurring in the paperwork—more than usual."

"People get tired," Malone said tentatively.

"But computer-secretary calculating machines don't," Burris said. "And that's where the errors are—in the computer-secretaries down in the Senate Office Building. I think you'd better start out there."

"Sure," Malone said sadly.

"See if there's any mechanical or electrical defect in any of those computers, Burris said. "Talk to the computer technicians. Find out what's causing all these errors."

"Yes, sir," Malone said. He was still trying to feel resigned, but he wasn't succeeding very well.

"And if you don't find anything—" Burris began.

"I'll come right back," Malone said instantly.

"No," Burris said. "You keep on looking."

"I do?"

"You do," Burris said. "After all, there has to be *something* wrong."

"Sure," Malone said, "if you say so. But—"

"There are the interview tapes," Burris said, "and the reports the congressmen brought in. You can go through those."

Malone sighed. "I guess so," he said.

"And there must be thousands of other things to do," Burris said.

"Well—" Malone began cautiously.

"You'll be able to think of them," Burris said heartily. "I know you will. I have confidence in you, Malone. Confidence."

"Thanks," Malone said sadly.

"You just keep me posted from time to time on what you're doing, and what ideas you get," Burris said. "I'm leaving the whole thing in your hands, Malone, and I'm sure you won't disappoint me."

"I'll try," Malone said.

"I know you will," Burris said warmly. "And no matter how long it takes—I know you'll succeed."

"No matter how long it takes?" Malone said hesitantly.

"That's right!" Burris said. "You can do it, Malone! You can do it."

Malone nodded slowly. "I hope so," he said. "Well, I . . . well, I'll start out right away, then."

He turned. Before he could make another move Burris said: "Wait!"

Malone turned again, hope in his eyes. "Yes, sir?" he said.

"When you leave—" Burris began, and the hope disappeared "please do one little favor for me. Just one little favor, because I'm an old, tired man and I'm not used to things any more."

"Sure," Malone said. "Anything, Chief."

"Don't call me—"

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"Sorry," Malone said.

Burris breathed heavily. "When you leave," he said, "please, please use the door."

"But—"

"Malone," Burris said, "I've tried. I've really tried. Believe me. I've tried to get used to the fact that you can teleport. But—"

"It's useful," Malone said, "in my work."

"I can see that," Burris said. "And I don't want you to . . . well, to stop doing it. By no means. It's just that it sort of unnerves me, if you see what I mean. No matter how useful it is for the FBI to have an agent who can go instantaneously from one place to another, it unnerves me." He sighed. "I can't get used to seeing you disappear like an over-dried soap bubble, Malone. It does something to me—here." He placed a hand directly over his sternum and sighed again.

"I can understand that," Malone said. "It unnerved me, too, the first time I saw it. I thought I was going crazy, when that kid—Mike Fueyo—winked out like a light. But then we got him, and some FBI agents besides me have learned the trick." He stopped there, wondering if he'd been tactful. After all, it took a latent ability to learn teleportation, and some people had it, while others didn't. Malone, along with a few other agents, did. Burris evidently didn't—so he couldn't teleport, no matter how hard he tried or how many lessons he took.

"Well," Burris said, "I'm still unnerved. So . . . please, Malone . . . when you come in here, or go out, use the door. All right?"

"Yes, sir," Malone said. He turned and went out. As he opened the door, he could almost hear Burris' sigh of relief. Then he banged it shut behind him and, feeling that he might as well continue with his spacebound existence, walked all the way to the elevator, and rode it downstairs to the FBI laboratories.

The labs, highly efficient and divided into dozens of departments, covered several floors. Malone passed through the Fingerprint section, filled with technicians doing strange things to great charts and slides, and frowning over tiny pieces of material and photographs. Then came Forgery Detection, involving many more technicians, many more slides and charts and tiny pieces of things and photographs, and even a witness or two sitting on the white bench at one side and looking lost and somehow civilian. Identification Classified was next, a great barn of a room filled with index files. The real indexes were in the sub-basement; here, on microfilm, were only the basic division. A man was standing in front of one of the files, frowning at it. Malone went on by without stopping.

Cosmetic Surgery Classification came next. Here there were more indexes, and there were also charts and slides. There was an FBI agent sitting on a bench looking bored while two female technicians—classified as O&U for Old and Ugly in Malone's mind—fluttered around him, deciding what disguises were possible, and

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which of those was indicated for the particular job on hand. Malone waved to the agent, whom he knew very slightly, and went on. He felt vaguely regretful that the FBI couldn't hire prettier girls for the Cosmetic Surgery Division, but the trouble was that pretty girls fell for the agents—and vice versa—and this led to an unfortunate tendency toward only handsome and virile-looking disguises. The O&U Division was unfortunate, he decided, but a necessity.

Chemical Analysis (III) was next. The Chemical Analysis section was scattered over several floors, with the first stages up above. Division III, Malone remembered, was devoted to non-poisonous substances—like clay or sand found in boots or trouser cuffs, cigar ashes and such. They were placed on the same floor as Fingerprints to allow free and frequent passage between the sections on the problems of plastic prints—made in putty or like substances—and visible prints, made when the hand is covered with a visible substance like blood, ketchup or glue.

Malone found what he was looking for at the very end of the floor. It was the Computer Section, a large room filled with humming, clacking and buzzing machines of an ancient vintage, muttering to themselves as they worked, and newer machines which were smaller and more silent. Lights were lighting and bells were ringing softly, relays were relaying and the whole room was a gigantic maze of calculating and control machines. What space wasn't filled by the machines themselves was filled by workbenches, all littered with an assortment of gears, tubes, spare relays, transistors, wires, rods, bolts, resistors and all the other paraphernalia used in building the machines and repairing them. Beyond the basic room were other, smaller rooms, each assigned to a particular kind of computer work.

The narrow aisles were choked here and there with men who looked up as Malone passed by, but most of them gave him one quick glance and went back to work. A few didn't even do that, but went right on concentrating on their jobs. Malone headed for a man working all alone in front of a workbench, frowning down at a complicated-looking mechanism that seemed to have neither head nor tail, and prodding at it with a long, thin screwdriver. The man was thin, too, but not very long; he was a little under average height, and he had straight black hair, thick-lensed glasses and a studious expresion, even when he was frowning. He looked as if the mechanism were a student who had cut too many classes, and he was being kindly but firm with it.

Malone managed to get to the man's side, and coughed discreetly. There was no response.

"Fred?" he said.

The screwdriver waggled a little. Malone wasn't quite sure that the man was breathing.

"Fred Mitchell," he said.

Mitchell didn't look up. Another second passed.

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"Hey," Malone said. Then he closed his eyes and took a deep breath. "Fred," he said in a loud, reasonable-sounding voice, "the State Department's translator has started to talk pig-Latin."

Mitchell straightened up as if somebody had jabbed him with a pin. The screwdriver waved wildly in the air for a second, and then pointed at Malone. "That's impossible," Mitchell said in a flat, precise voice. "Simply impossible. It doesn't have a pig-Latin circuit. It can't possibly—" He blinked and seemed to see Malone for the first time. "Oh," he said. "Hello, Malone. What can I do for you?"

Malone smiled, feeling a little victorious at having got through the Mitchell armor, which was almost impregnable when there was a job in hand. "I've been standing here talking to you for some time."

"Oh, have you?" Mitchell said. "I was busy." That, obviously, explained that. Malone shrugged.

"I want you to help me check over some calculators, Fred," he said. "We've had some reports that some of the government machines are out of kilter, and I'd like you to go over them for me."

"Out of kilter?" Fred Mitchell said. "No, you can forget about it. It's absolutely unnecessary to make a check —believe me. Absolutely. Forget it." He smiled suddenly. "I suppose it's some kind of a joke, isn't it?" he said, just a trifle uncertainly. Fred Mitchell's world, while pleasant, did not include much humor, Malone knew. "It's supposed to be funny," he said in the same flat, precise voice.

"It isn't funny," Malone said.

Fred sighed. "Then they're obviously lying," he said, "and that's all there is to it. Why bother me with it?"

"Certainly," Fred said. He looked at the machinery with longing.

Malone took a breath. "How do you know?" he said.

Fred sighed. "It's perfectly obvious," he said in a patient tone. "Since the State Department translator has no pig-Latin circuit, it can't possibly be talking pig-Latin. I will admit that such a circuit would be relatively easy to build, though it would have no utility as far as I can see. Except, of course, for a joke." He paused. "Joke?" he said, in a slightly uneasy tone.

"Sure," Malone said. "Joke."

Mitchell looked relieved. "Very well, then," he began. "Since—"

"Wait a minute," Malone said. "The pig-Latin is a joke. That's right. But I'm not talking about the pig-Latin."

"You're not?" Mitchell asked, surprised.

"No," Malone said.

Mitchell frowned. "But you said —" he began.

"A joke," Malone said. "You were perfectly right. The pig-Latin is a joke." He waited for Fred's expression to clear, and then added: "But what I want to talk to you about isn't."

"It sounds very confused," Fred said after a pause. "Not at all the sort of thing that . . . that usually goes on."

"You have no idea," Malone said. "It's about the political machines, all

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right, but it isn't anything as simple as pig-Latin." He explained, taking his time over it.

When he had finished, Fred was nodding his head slowly. "I see," he said. "I understand just what you want me to do."

"Good," Malone said.

"I'll take a team over to the Senate Office Building," Fred said, "and check the computer-secretaries there. That way, you see, I'll be able to do a full running check on them without taking any one machine out of operation for too long."

"Sure," Malone said.

"And it shouldn't take long," Fred went on, "to find out just what the trouble is." He looked very confident.

"How long?" Malone asked.

Fred shrugged. "Oh," he said, "five or six days."

Malone repressed an impulse to scream. "Days?" he said. "I mean . . . well, look, Fred, it's important. Very important. Can't you do the job any faster?"

Fred gave a little sigh. "Checking and repairing all those machines," he said, "is an extremely complex job. Sometimes, Malone, I don't think you realize quite how complex, and how delicate a job it is to deal with such a high-order machine. Why—"

"Wait a minute," Malone said. "Check and repair them?"

"Of course," Fred said.

"But I don't want them repaired," Malone said. Seeing the look of horror on Fred's face, he added hastily: "I only want a report from you on what's wrong, whether they are actually making errors or not. And if they are making errors, just what's making them do it. And just what kind of errors. See?"

Fred nodded very slowly. "But I can't just . . . just leave them there," he said piteously. "In . . . pieces and everything. It isn't right, Malone. It just isn't right."

"Well, then," Malone said with energy, "you go right ahead and repair them, if you want to. Fix 'em all up. But you can do that *after* you make the report to me, can't you?"

"I—" Fred hesitated. "I had planned to check and repair each machine on an individual basis—"

"The Congress can allow for a short suspension," Malone said. "Anyhow, they can now—or as soon as I get the word to them. Suppose you check all the machines first, and then get around to the repair work."

"It's not the best way," Fred demurred.

Malone discovered that it was his turn to sigh. "Is it the fastest?" he said.

Fred nodded.

"Then it's the best," Malone said. "How long?"

Fred rolled his eyes to the ceiling and calculated silently for a second. "Tomorrow morning," he announced, returning his gaze to Malone.

"Fine," Malone said. "Fine."

"But—"

"Never mind the buts," Malone said hurriedly. "I'll count on hearing from you tomorrow morning."

"Oh—" Fred said. "All right."

"And if it looks like sabotage," Ma-

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lone added, "if the errors aren't caused by normal wear and tear on the machines—you let me know right away. Phone me. Don't waste an instant."

"I'll . . . I'll start right away," Fred said heavily. He looked sadly at the mechanism he had been working on, and put his screwdriver down next to it. It looked to Malone as if he were putting flowers on the grave of a dear departed. "I'll get a team together," Fred added. He gave the mechanism and screwdriver one last fond parting look.

Malone looked after him for a second, thinking of nothing in particular, and then turned in the opposite direction and headed back toward the elevator. As he walked, he began to feel more and more pleased with himself. After all, he'd gotten the investigation started, hadn't he?

And now all he had to do was go back to his office and read some reports and listen to some interview tapes, and then he could go home.

The reports and the interview tapes didn't exactly sound like fun, Malone thought, but at the same time they seemed fairly innocent. He would work his way through them grimly, and maybe he would even indulge his most secret vice and smoke a cigar or two to make the work pass more pleasantly. Soon enough, he told himself, they would be finished with.

Sometimes, though, he regretted the reputation he'd gotten. It had been bad enough in the old days—the pre-1971 days when Malone had thought he was just lucky. Burris had called him a Boy Wonder then, when he'd cracked three difficult cases in a row. Being just lucky had made it a little

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tough to live with the Boy Wonder label—after all, Malone thought, it wasn't actually as if he'd done anything.

But since 1971 and the case of the Telepathic Spy, things had gotten worse. Much worse. Now Malone wasn't just lucky any more. Instead, he could teleport and he could even foretell the future a little, in a dim sort of way. He'd caught the Telepathic Spy that way, and when the case of the Teleporting Juvenile Delinquents had come up he'd been assigned to that one too, and he'd cracked it. Now Burris seemed to think of him as a kind of god, and gave him all the tough dirty jobs.

And if he wasn't just lucky any more, Malone couldn't think of himself as a Fearless, Heroic FBI Agent, either. He just wasn't the type. He was—well, talented. That was the word, he told himself: talented. He had all these talents and they made him look like something spectacular to Burris and the other FBI men. But he wasn't, really. He hadn't done anything really tough to get his talents; they'd just happened to him.

Nobody, though, seemed to believe that. He heaved a little sigh and stepped into the waiting elevator.

There were, after all, he thought, compensations. He'd had some good times, and the talents did come in handy. And he did have his pick of the vacation schedule lately. And he'd met some lovely girls—

And besides, he told himself savagely as the elevator shot upward, he wasn't going to do anything except return to his office and read some reports and listen to some tapes. And then he was going to go home and sleep all night, peacefully. And in the morning Mitchell was going to call him up and tell him that the computer-secretaries needed nothing more than a little repair. He'd say they were getting old, and he'd be a little pathetic about it; but it wouldn't be anything serious. Malone would send out orders to get the machines repaired, and that would be that. And then the next case would be something both normal and exciting, like a bank robbery or a kidnaping involving a gorgeous blonde who would be so grateful to Malone that —

He had stepped out of the elevator and gone down the corridor without noticing it. He pushed at his own office door and walked into the outer room. The train of thought he had been following was very nice, and sounded very attractive indeed, he told himself.

Unfortunately, he didn't believe it. His prescient ability, functioning with its usual efficient aplomb, told Malone that things would not be better, or simpler, in the morning. They would be worse, and more complicated.

They would be quite a lot worse.

And, as usual, that prescience was perfectly accurate.

II

The telephone, Malone realized belatedly, had had a particularly nasty-

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sounding ring. He might have known it would be bad news.

As a matter of fact, he told himself sadly, he had known.

"Nothing at all wrong?" he said into the mouthpiece. "Not with any of the computers?" He blinked. "Not even one of them?"

"Not a thing," Mitchell said. "I'll be sending a report up to you in a little while. You read it; we put them through every test, and it's all detailed there."

"I'm sure you were very thorough," Malone said helplessly.

"Of course we were," Mitchell said. "Of course. And the machines passed every single test. Every one. Malone, it was beautiful."

"Goody," Malone said at random. "But there's got to be something—"

"There is, Malone," Fred said. "There is. I think there's definitely something odd going on. Something funny. I mean peculiar, not humorous."

"I thought so," Malone put in.

"Right," Fred said. "Malone, try and relax. This is a hard thing to say, and it must be even harder to hear. But—"

"Tell me," Malone said. "Who's dead? Who's been killed?"

"I know it's tough, Malone," Fred went on.

"Is everybody dead?" Malone said. "It can't be just one person, not from that tone in your voice. Has somebody assassinated the entire Senate? Or the President and his Cabinet? Or—"

"It's nothing like that, Malone," Fred said, in a tone that implied that such occurrences were really rather minor. "It's the machines."

"The machines?"

"That's right," Fred said grimly. "After we checked them over and found they were in good shape, I asked for samples of both the input and the output of each machine. I wanted to do a thorough job."

"Congratulations," Malone said. "What happened?"

Fred took a deep breath. "They don't agree," he said.

"They don't?" Malone said. The phrase sounded as if it meant something momentous, but he couldn't quite figure out what. In a minute, he thought confusedly, it would come to him. But did he want it to?

"They definitely do not agree," Fred was saying. "The correlation is erratic; it makes no statistical sense. Malone, there are two possibilities."

"Tell me about them," Malone said. He was beginning to feel relieved. To Fred, the malfunction of a machine was more serious than the murder of the entire Congress. But Malone couldn't quite bring himself to feel that way about things.

"First," Fred said in a tense tone, "it's possible that the technicians feeding information to the machines are making all kinds of mistakes."

Malone nodded at the phone. "That sounds possible," he said. "Which ones?"

"All of them," Fred said. "They're all making errors—and they're all making about the same number of errors. There don't seem to be any

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real peaks or valleys, Malone; everybody's doing it."

Malone thought of the Varsity Drag and repressed the thought. "A bunch of fumblebums, "he said. "All fumbling alike. It does sound unlikely, but I guess it's possible. We'll get after them right away, and—"

"Wait," Fred said. "There is a second possibility."

"Oh," Malone said.

"Maybe they aren't mistakes," Fred said. "Maybe the technicians are deliberately feeding the machine with wrong answers."

Malone hated to admit, even to himself, but that answer sounded a lot more probable. Machine technicians weren't exactly picked off the streets at random; they were highly trained for their work, and the idea of a whole crew of them starting to fumble at once, in a big way, was a little hard to swallow.

The idea of all of them sabotaging the machines they worked on, Malone thought, was a tough one to take, too. But it had the advantage of making some sense. People, he told himself dully, will do nutty things deliberately. It's harder to think of them doing the same nutty things without knowing it.

"Well," he said at last, "however it turns out, we'll get to the bottom of it. Frankly, I think it's being done on purpose."

"So do I," Fred said. "And when you find out just who's making the technicians do such things—when you find out who gives them their orders—you let me know."

"Let you know?" Malone said. "But—"

"Any man who would give false data to a perfectly innocent computer," Fred said savagely, "would . . . would—" For a second he was apparently lost for comparisons. Then he finished: "Would kill his own mother." He paused a second and added, in an even more savage voice: "And then lie about it!"

The image on the screen snapped off, and Malone sat back in his chair and sighed. He spent a few minutes regretting that he hadn't chosen, early in life, to be a missionary to the Fiji Islanders, or possibly simply a drunken bum without any trouble, and then the report Mitchell had mentioned arrived. Malone picked it up without much eagerness, and began going through it carefully.

It was beautifully typed and arranged; somebody on Mitchell's team had obviously been up all night at the job. Malone admired the work, without being able to get enthusiastic about the contents. Like all technical reports, it tended to be boring and just a trifle obscure to someone who wasn't completely familiar with the field involved. Malone and cybernetics were not exactly bosom buddies, and by the time he finished reading through the report he was suffering from an extreme case of *ennui*.

There were no new clues in the report, either; Mitchell's phone conversation had covered all of the main points. Malone put the sheaf of papers down on his desk and looked at

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them for a minute as if he expected an answer to leap out from the pile and greet him with a glad cry, but nothing happened. Unfortunately, he had to do some more work.

The obvious next step was to start checking on the technicians who were working on the machines. Malone determined privately that he would give none of his reports to Fred Mitchell; he didn't like the idea of being responsible for murder, and that was the least Fred would do to someone who confused his precious calculators.

He picked up the phone, punched for the Records Division, and waited until a bald, middle-aged face appeared. He asked the face to send up the dossiers of the technicians concerned to his office. The face nodded.

"You want them right away?" it said in a mild, slightly scratchy voice.

"Sooner than right away," Malone said.

"They're coming up by messenger," the voice said.

Malone nodded and broke the connection. The technicians had, of course, been investigated by the FBI before they'd been hired, but it wouldn't do any harm to check them out again. He felt grateful that he wouldn't have to do all that work himself; he would just go through the dossiers and assign field agents to the actual checking when he had a picture of what might need to be checked.

He sighed again and leaned back in his chair. He put his feet up on the desk, remembered that he was entirely alone, and swung them down again. He fished in a private compartment in his top desk drawer, drew out a cigar and unwrapped it. Putting his feet back on the desk, he lit the cigar, drew in a cloud of smoke, and lapsed into deep thought.

Cigar smoke billowed around him, making strange, fantastic shapes in the air of the office. Malone puffed away, frowning slightly and trying to force the puzzle he was working on to make some sense.

It certainly looked as though something were going on, he thought. But, for the life of him, he couldn't figure out just what it was. After all, what could be anybody's purpose in goofing up a bunch of calculators the way they had? Of course, the whole thing could be a series of accidents, but the series was a pretty long one, and made Malone suspicious to start with. It was easier to assume that the goof-ups were being done deliberately.

Unfortunately, they didn't make much sense as sabotage, either.

Senator Deeds, for instance, had sent out a ten-thousand-copy form letter to his constituents, blasting an Administration power bill in extremely strong language, and asking for some comments on the Deeds-Hartshorn Air Ownership Bill, a pending piece of legislation that provided for private, personal ownership, based on land title, to the upper stratosphere —with a strong hint that rights of passage no longer applied without some recompense to the owner of the air. Naturally, Deeds had filed the original with a computer-secretary to

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turn out ten thousand duplicate copies, and the machine had done so, folding the copies, slipping them into addressed envelopes and sending them out under the senator's franking stamp.

The addresses on the envelopes, however, had not been those of the senator's supporters. The letter had been sent to ten thousand stockholders in major airline companies, and the senator's head was still ringing from the force of the denunciatory letters, telegrams and telephone calls he'd been getting.

And then there was Representative Follansbee of South Dakota. A set of news releases on the proposed Follansbee Waterworks Bill contained the statement that the artificial lake which Follansbee proposed in the Black Hills country "be formed by controlled atomic power blasts, and filled with water obtained from collecting the tears of widows and orphans."

Newsmen who saw this release immediately checked the bill. The wording was exactly the same. Follansbee claimed that the "widows and orphans" phrase had appeared in his speech on the bill, and not in the proposed bill itself. "It's completely absurd," he said, with commendable calm, "to consider this method of filling an artificial lake." Unfortunately, the absurdity was now contained in the bill, which would have to go back to committee for redefinition, and probably wouldn't come up again in the present session of Congress. Judging from the amount of laughter that had greeted the error when it had come to light, Malone privately doubted whether any amount of redefinition was going to save it from a landslide defeat.

Representative Keller of Idaho had made a speech which contained so many errors in fact that newspaper editorials, and his enemies on the floor of Congress, cut him to pieces with ease and pleasure. Keller complained of his innocence and said he'd gotten his facts from a computer-secretary, but this didn't save him. His re-election was a matter for grave concern in his own party, and the opposition was, naturally, tickled. They would not, Malone thought, dare to be tickled pink.

And these were not the only casualties. They were the most blatant foul-ups, but there were others, such as the mistake in numbering of a House Bill that resulted in a two-month delay during which the opposition to the bill raised enough votes to defeat it on the floor. Communications were diverted or lost or scrambled in small ways that made for confusion—including, Malone recalled, the perfectly horrible mixup that resulted when a freshman senator, thinking he was talking to his girlfriend on a blanked-vision circuit, discovered he was talking to his wife.

The flow of information was being blocked by bottlenecks that suddenly existed where there had never been bottlenecks before.

And it wasn't only the computers, Malone knew. He remembered the

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reports the senators and representatives had made. Someone forgot to send an important message here, or sent one too soon over there. Both courses were equally disturbing, and both resulted in more snarl-ups. Reports that should have been sent in weeks before arrived too late; reports meant for the eyes of only one man were turned out in triplicate and passed all over the offices of Congress.

Each snarl-up was a little one. But, together, they added up to inefficiency of a kind and extent that hadn't been seen, Malone told himself with some wonder, since the Harding administration fifty years before.

And there didn't seem to be anyone to blame anything on.

Malone thought hopefully of sabotage, infiltration and mass treason, but it didn't make him feel much better. He puffed out some more smoke and frowned at nothing.

There was a knock at the door of his office.

Speedily and guiltily, he swung his feet off the desk and snatched the cigar out of his mouth. He jammed it into a deep ashtray and put the ashtray back into his desk drawer. He locked the drawer, waved ineffectively at the clouds of smoke that surrounded him, and said in a resigned voice: "Come in."

The door opened. A tall, solidly built man stood there, wearing a fringe of beard and a cheerful expression. The man had an enormous amount of muscle distributed more or less evenly over his chunky body, and a potbelly that looked as if he had swallowed a globe of the world. In addition, he was smoking a cigarette and letting out little puffs of smoke, rather like a toy locomotive.

"Well, well," Malone said, brushing feebly at the smoke that still wreathed him faintly. "If it isn't Thomas Boyd, the FBI's answer to Nero Wolfe."

"And if the physique holds true, you're Sherlock Holmes, I suppose," Boyd said.

Malone shook his head, thinking sadly of his father and the cigar. "Not exactly," he said. "Not ex—" And then it came to him. It wasn't that he was ashamed of smoking cigars like his father, exactly—but cigars just weren't right for a fearless, dedicated FBI agent. And he had just thought of a way to keep Boyd from knowing what he'd been doing. "That's a hell of a cigarette you're smoking, by the way," he said.

Boyd looked at it. "It is?" he said.

"Sure is," Malone said, hoping he sounded sufficiently innocent. "Smells like a cigar or something."

Boyd sniffed the air for a second, his face wrinkled. Then he looked down at his cigarette again. "You're right, Ken. It *does* smell like a cigar." He came over to Malone's desk, looked around for an ashtray and didn't find one, and finally went to the window and tossed the cigarette out into the Washington breeze. "How are things, anyhow, Ken?" he said.

"Things are confused," Malone said. "Aren't they always?"

Boyd came back to the desk and

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sat down in a chair at one side of it. He put his elbow on the desk. "Sure they are," he said. "I'm confused myself, as a matter of fact. Only I think I know where I can get some help."

"Really?" Malone said.

Boyd nodded. "Burris told me I might be able to get some information from a certain famous and highly respected person," he said.

"Well, well," Malone said. "Who?"

"You," Boyd said.

"Oh," Malone said, trying to look disappointed, flattered and modest all at the same time. "Well," he went on after a second, "anything I can do—"

"Burris thought you might have some answers," Boyd said.

"Burris is getting optimistic in his old age," Malone said. "I don't even have many questions."

Boyd nodded. "Well," he said, "you know this California thing?"

"Sure I do," Malone said. "You're looking into the resignation out there, aren't you?"

"Senator Burley," Boyd said. "That's right. But Senator Burley's resignation isn't all of it, by any means."

"It isn't?" Malone said, trying to sound interested.

"Not at all," Boyd said. "It goes a lot deeper than it looks on the surface. In the past year, Ken, five senators have announced their resignations from the Senate of the United States. It isn't exactly a record—"

"It sounds like a record," Malone said.

"Well," Boyd said, "there was 1860 and the Civil War, when a whole lot of senators and representatives resigned all at once."

"Oh," Malone said. "But there isn't any Civil War going on now. At least," he added, "I haven't heard of any."

"That's what makes it so funny," Boyd said. "Of course, Senator Burley said it was ill health, and so did two others, while Senator Davidson said it was old age."

"Well," Malone said, "people do get old. And sick."

"Sure," Boyd said. "The only trouble is—" He paused. "Ken," he said, "do you mind if I smoke? I mean, do you mind the smell of cigars?"

"Mind?" Malone said. "Not at all. Not at all." He blinked. "Besides," he added, "maybe this one won't smell like a cigar."

"Well, the last one did," Boyd said. He took a cigarette out of a pack in his pocket, and lit it. He sniffed. "You know," he said, "You're right. This one doesn't."

"I told you," Malone said. "Must have been a bad cigarette. Spoiled or something."

"I guess so," Boyd said vaguely. "But about these retirements—the FBI wanted me to look into it because of Burley's being mixed up with the space program scandal last year. Remember?

"Vaguely," Malone said. "I was busy last year."

"Sure you were," Boyd said. "We were both busy getting famous and well-known."

Malone grinned. "Go on with the story," he said.

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Boyd puffed at his cigarette. "Anyhow, we couldn't find anything really wrong," he said. "Three senators retiring because of ill health, one because of old age. And Farnsworth, the youngest. He had a nervous breakdown."

"I didn't hear about it," Malone said.

Boyd shrugged. "We hushed it up," he said. "But Farnsworth's got delusions of persecution. He apparently thinks somebody's out to get him. As a matter of fact, he thinks *everybody's* out to get him."

"Now that," Malone said, "sounds familiar."

Boyd leaned back a little more in his chair. "Here's the funny thing, though," he said. "The others all act as if they're suspicious of everybody who talks to them. Not anything obvious, you understand. Just—worried. Apprehensive. Always looking at you out of the corners of their eyes. That kind of thing."

Malone thought of Senator Lefferts, who was also suffering from delusions of persecution—delusions that had real evidence to back them up. "It does sound funny," he said cautiously.

"Well, I reported everything to Burris," Boyd went on. "And he said you were working on something similar, and we might as well pool our resources."

"Here we go again," Malone said. He took a deep breath, filling his nostrils with what remained of the cigar odor in the room, and felt more peaceful. Quickly, he told Boyd about what had been happening in Congress. "It seems pretty obvious," he finished, "that there is some kind of a tie-up between the two cases."

"Maybe it's obvious," Boyd said, "But it is just a little bit odd. Fun and games. You know, Ken, Burris was right."

"How?" Malone said.

"He said everything was all mixed up," Boyd went on. "He told me the country was going to Rome in a handbasket, or something like that."

Wondering vaguely if Burris had really been predicting mass religious conversions, Malone nodded silently.

"And he's right," Boyd said. "Look at the newspapers. Everything's screwy lately."

"Everything always is screwy," Malone said.

"Not like now," Boyd said. "So many big-shot gangsters have been killed lately we might as well bring back Prohibition. And the labor unions are so busy with internal battles that they haven't had time to go on strike for over a year."

"Is that bad?" Malone said.

Boyd shrugged. "God knows," he said. "But it's sure confusing as all hell."

"And now," Malone said, "with all that going on—"

"The Congress of the United States decides to go off its collective rocker," Boyd finished. "Exactly." He stared down at his cigarette for a minute with a morose and pensive expression on his face. He looked, Malone thought, like Henry VIII trying to de-

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cide what to do about all these here wives.

Then he looked up at Malone. "Ken," he said in a strained voice, "there seem to be a lot of nutty cases lately."

Malone considered. "No," he said at last. "It's just that when a nutty one comes along, we get it."

"That's what I mean," Boyd said. "I wonder why that is."

Malone shrugged. "It takes a thief to catch a thief," he said.

"But these aren't thieves," Boyd said. "I mean—they're just nutty." He paused. "Oh," he said.

"And two thieves are better than one," Malone said.

"Anyhow," Boyd said with a small, gusty sigh, "it's company."

"Sure," Malone said.

Boyd looked for an ashtray, failed again to find one, and walked over to flip a second cigarette out onto Washington. He came back to his chair, sat down, and said: "What's our next step, Ken?"

Malone considered carefully. "First," he said finally, "we'll start assuming something. We'll start assuming that there is some kind of organization behind all this—behind all the senators' resignations and everything like that."

"It sounds like a big assumption," Boyd said.

Malone shook his head. "It isn't really," he said. "After all, we can't figure it's the work of one person: it's too widespread for that. And it's silly to assume that everything's accidental."

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"All right," Boyd said equably. "It's an organization."

"Trying to subvert the United States," Malone went on. "Reducing everything to chaos. And that brings in everything else, Tom: That brings in the unions and the gang wars and everything."

Boyd blinked. "How?" he said.

"Obvious," Malone said. "Strife brought on by internal confusion—that's what's going on all over. It's the same pattern. And if we assume an organization trying to jam up the United States, it even makes sense." He leaned back and beamed.

"Sure it makes sense," Boyd said. "But who's the organization?"

Malone shrugged.

"If I were doing the picking," Boyd said, "I'd pick the Russians. Or the Chinese. Or both. Probably both."

"It's a possibility," Malone said. "Anyhow, if it's sabotage, who else would be interested in sabotaging the United States? There's some Russian or Chinese organization fouling up Congress, and the unions, and the gangs. Come to think of it, why the gangs? It seems to me that if you left the professional gangsters strong, it would do even more to foul things up."

"Who knows?" Boyd said. "Maybe they're trying to get rid of American gangsters so they can import some of their own."

"That doesn't make any sense," Malone said, "but I'll think about it. In the meantime, we have one more interesting question."

"We do?" Boyd said.

"Sure we do," Malone said. "The question is: How?"

Boyd said: "Hm-m-m." Then there was silence for a little while.

"How are the saboteurs doing all this?" Malone said. "It just doesn't seem very probable that *all* the technicians in the Senate Office Building, for instance, are spies. It makes even less sense that the labor unions are composed mostly of spies. Or, for that matter, the Mafia and the organizations like it. What would spies be doing in the Mafia?"

"Learning Italian," Boyd said instantly.

"Don't be silly," Malone said. "If there were that many spies in this country, the Russians wouldn't have to fight at all. They could *vote* the Communists into power—and by a nice big landslide, too."

"Wait a minute," Boyd said. "If there aren't so many spies, then how is all this getting done?"

Malone beamed. "That's the question," he said. "And I think I have answer."

"You do?" Boyd said. After a second he said: "Oh, no."

"Suppose you tell me," Malone said.

Boyd opened his mouth. Nothing emerged. He shut it. A second passed and he opened it again. "Magic?" he said weakly.

"Not exactly," Malone said cheerfully. "But you're getting warm."

Boyd shut his eyes. "I'm not going to stand for it," he announced. "I'm not going to take any more."

"Any more what?" Malone said. "Tell me what you have in mind."

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"I won't even consider it," Boyd said. "It haunts me. It gets into my dreams. Now, look, Ken: I can't even see a pitchfork any more without thinking of Greek letters."

Malone took a breath. "Which Greek letter?" he said.

"You know very well," Boyd said. "What a pitchfork looks like. *Psi.* And I'm not even going to think about it."

"Well," Malone said equably, "you won't have to. If you'd rather start with the Russian spy end of things, you can do that."

"What I'd rather do," Boyd said, "is resign."

"Next year," Malone said instantly. "For now, you can wait around until the dossiers come up—they're for the Senate Office Building technicians, and they're on the way. You can go over them, and start checking on any known Russian agents in the country for contacts. You can also start checking on the dossiers, and in general for any hanky-panky."

Boyd blinked. "Hanky-panky?" he said.

"It's a perfectly good word," Malone said, offended. "Or two words. Anyhow, you can start on that end, and not worry about anything else."

"It's going to haunt me," Boyd said.

"Well," Malone said, "eat lots of ectoplasm and get enough sleep, and everything will be fine. After all, I'm going to have to do the real end of the work—the psionics end. I may be wrong, but—"

He was interrupted by the phone. He flicked the switch and Andrew J. Burris' face appeared on the screen.

"Malone," Burris said instantly, "I just got a complaint from the State Department that ties in with your work. Their translator has been acting up."

Malone couldn't say anything for a minute.

"Malone," Burris went on. "I said —"

"I heard you," Malone said. "And it doesn't have one."

"It doesn't have one what?" Burris said.

"A pig-Latin circuit," Malone said. "What else?"

Burris' voice was very calm. "Malone," he said, "what does pig-Latin have to do with anything?"

"You said—"

"I said one of the State Department translators was acting up," Burris said. "If you want details—"

"I don't think I can stand them," Malone said.

"Some of the Russian and Chinese releases have come through with the meaning slightly altered," Burris went on doggedly. "And I want you to check on it right away. I—"

"Thank God," Malone said.

Burris blinked. "What?"

"Never mind," Malone said. "Never mind. I'm glad you told me, Chief. I'll get to work on it right away, and —"

"You do that, Malone," Burris said. "And stop calling me Chief! Do I look like an Indian? Do I have feathers in my hair?"

"Anything," Malone said grandly,

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"is possible." He broke the connection in a hurry.

III

The summer sun beat down on the white city of Washington, D. C. as if it had mistaken its instructions slightly, and was convinced that the city had been put down somewhere in the Sahara. The sun seemed confused, Malone thought. If this were the Sahara, obviously there was no reason whatever for the Potomac to be running through it. The sun was doing its best to correct this small error, however, by exerting even more heat in a valiant attempt to dry up the river.

Its attempt was succeeding, at least partially. The Potomac was still there, but quite a lot of it was not in the river bed any more. Instead, it had gone into the air, which was so humid by now that Malone was willing to swear that it was splashing into his lungs at every inhalation. Resisting an impulse to try the breast-stroke, he stood in the full glare of the straining sun, just outside the Senate Office Building. He looked across at the Capitol, squinting his eyes manfully against the glare of its dome in the brightness.

The Capitol was, at any rate, some relief from the sight of Thomas Boyd and a group of agents busily grilling two technicians. That was going on in the Senate Office Building, and Malone had come over to watch the proceedings. Everything had been set up in what Malone considered the most complicated fashion possible. A big room had been turned into a projection chamber, and films were being run off over and over. The films, taken by hidden cameras watching the computer-secretaries, had caught two technicians red-handed punching errors into the machines. Boyd had leaped on this evidence, and he and his crew were showing the movies to the technicians and questioning them under bright lights in an effort to break down their resistance.

But it didn't look as though they were going to have any more success than the sun was having, turning Washington into the Sahara. After all, Malone told himself, wiping his streaming brow, there were no Pyramids in Washington. He tried to discover whether that made any sense, but it was too much work. He went back to thinking about Boyd.

The technicians were sticking to their original stories, that the mistakes had been honest ones. It sounded like a sensible idea to Malone; after all, people did make mistakes. And the FBI didn't have a single shred of evidence to prove that the technicians were engaged in deliberate sabotage. But Boyd wasn't giving up. Over and over he got the technicians to repeat their stories, looking for discrepancies or slips. Over and over he ran off the films of their mistakes, looking for some clue, some shred of evidence.

Even the sight of the Capitol, Malone told himself sadly, was better than any more of Boyd's massive investigation techniques.

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He had come out to do some thinking. He believed, in spite of a good deal of evidence to the contrary, that his best ideas came to him while walking. At any rate, it was a way of getting away from four walls and from the prying eyes and anxious looks of superiors. He sighed gently, crammed his hat onto his head and started out.

Only a maniac, he reflected, would wear a hat on a day like the one he was swimming through. But the people who passed him as he trudged onward to no particular destination didn't seem to notice; they gave him a fairly wide berth, and seemed very polite, but that wasn't because they thought he was nuts, Malone knew. It was because they knew he was an FBI man.

That was the result of an FBI regulation. All agents had to wear hats. Malone wasn't sure why, and his thinking on the matter had only dredged up the idea that you had to have a hat in case somebody asked you to keep something under it. But the FBI was firm about its rulings. No matter what the weather, an agent wore a hat. Malone thought bitterly that he might just as well wear a red, white and blue luminous sign that said *FBI* in great winking letters, and maybe a hooting siren, too. Still, the Federal Bureau of Investigation was not supposed to be a secret organization—no matter what occasional critics might say. And the hats, at least as long as the weather remained broiling, were enough proof of that for anybody.

Malone could feel water collecting under his hat and soaking his head. He removed the hat quickly, wiped his head with a handkerchief and replaced the hat, feeling as if he had become incognito for a few seconds. The hat was back on now, feeling official but terrible, and about the same was true of the fully-loaded Smith & Wesson .44 Magnum revolver which hung in his shoulder holster. The harness chafed at his shoulder and chest and the weight of the gun itself was an added and unwelcome burden.

But even without the gun and the hat, Malone did not feel exactly chipper. His shirt and undershirt were no longer two garments, but one, welded together by seamless sweat and plastered heavily and not too skillfully to his skin. His trouser legs clung damply to calves and thighs, rubbing as he walked, and at the knees each trouser leg attached and detached itself with the unpleasant regularity of a wet bastinado. Inside Malone's shoes, his socks were completely awash, and he seemed to squish as he walked. It was hard to tell, but there seemed to be a small fish in his left shoe. It might, he told himself, be no more than a pebble or a wrinkle in his sock But he was willing to swear that it was swimming upstream.

And the forecast, he told himself bitterly, was for continued warm.

He forced himself to take his mind off his own troubles and get back to the troubles of the FBI in general, such as the problem at hand. It was an effort, but he frowned and kept

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walking, and within a block he was concentrating again on the *psi* powers.

Psi, he told himself, was behind the whole mess. In spite of Boyd's horrified refusal to believe such a thing, Malone was sure of it. Three years ago, of course, he wouldn't have considered the notion either. But since then a great many things had happened, and his horizons had widened. After all, capturing a double handful of totally insane, if perfectly genuine telepaths, from asylums all over the country, was enough by itself to widen quite a few stunned horizons. And then, later, there had been the gang of juvenile delinquents. They had been perfectly normal juvenile delinquents, stealing cars and bopping a stray policeman or two. It just happened, though, that they had solved the secret of instantaneous teleportation, too. This made them just a trifle unusual.

In capturing them, Malone, too, had learned the teleportation secret. Unlike Boyd, he thought, or Burris, the idea of psionic power didn't bother him much. After all, the psionic spectrum—if it was a spectrum at all—was just as much a natural phenomenon as gravity, or magnetism.

It was just a little hard for some people to get used to.

And, of course, he didn't fully understand *how* it worked, or *why*. This put him in the position, he told himself, of an Australian aborigine. He tried to imagine an Australian aborigine in a hat on a hot day, decided the aborigine would have too much sense, and got back off the subject again.

However, he thought grimly, there was this Australian aborigine. And he had a magnifying glass, which he'd picked up from the wreck of some ship. Using that—assuming that experience, or a friendly missionary, taught him how—he could manage to light a fire, using the sun's thermonuclear processes to do the job. Malone doubted that the aborigine knew anything about thermonuclear processes, but he could start a fire with them.

As a matter of fact, he told himself, the aborigine didn't understand oxidation, either. But he could use that fire, when he got it going. In spite of his lack of knowledge, the aborigine could use that nice, hot, burning fire . . .

Hurriedly, Malone pried his thoughts away from aborigines and heat, and tried to focus his mind elsewhere. He didn't understand psionic processes, he thought; but then, nobody did, really, as far as he knew. But he could use them.

And, obviously, somebody else could use them, too.

Only what kind of force was being used? What kind of psionic force would it take to make so many people in the United States goof up the way they were doing?

That, Malone told himself, was a good question, a basic and an important question. He was proud of himself for thinking of it.

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Unfortunately, he didn't have the answer.

But he thought he knew a way of getting one.

It was perfectly true that nobody knew much about how psionics worked. For that matter, nobody knew very much about how gravity worked. But there was still some information—and, in the case of psionics, Malone knew where it was to be found.

It was to be found in Yucca Flats, Nevada.

It was, of course, true that Nevada would probably be even hotter than Washington, D. C. But there was no help for that, Malone told himself sadly; and, besides, the cold chill of the expert himself would probably cool things off quite rapidly. Malone thought of Dr. Thomas O'Connor, the Westinghouse psionics expert and frowned. O'Connor was not exactly what might be called a friendly man.

But he did know more about psionics than anyone else Malone could think of. And his help had been invaluable in solving the two previous psionic cases Malone had worked on.

For a second he thought of calling O'Connor, but he brushed that thought aside bravely. In spite of the heat of Yucca Flats, he would have to talk to the man personally. He thought again of O'Connor's congealed personality, and wondered if it would really be effective in combating the heat. If it were, he told himself, he would take the man right back to Washington with him, and plug him into the air-conditioning lines.

He sighed deeply, thought about a cigar and decided regretfully against it, here on the public street where he would be visible to anyone. Instead, he looked around him, discovered that he was only a block from a large, neon-lit drugstore and headed for it. Less than a minute later he was in a phone booth.

The operators throughout the country seemed to suffer from heat prostration, and Malone was hardly inclined to blame them. But, all the same, it took several minutes for him to get through to Dr. O'Connor's office, and a minute or so more before he could convince a security-addled secretary that, after all, he would hardly blow O'Connor to bits over the long-distance phone.

Finally the secretary, with a sigh of reluctance, said she would see if Dr. O'Connor were available. Malone waited in the phone booth, opening the door every few seconds to breathe. The booth was air-conditioned, but remained for some mystical reason an even ten degrees above the boiling point of Malone's temper.

Finally Dr. O'Connor's lean, pallid face appeared on the screen. He had not changed since Malone had last seen him. He still looked, and acted, like one of Malone's more disliked law professors.

"Ah," the scientist said in a cold, precise voice. "Mr. Malone. I am sorry for our precautions, but you understand that security must be served."

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"Sure," Malone said.

"Being an FBI man, of course you would," Dr. O'Connor went on, his face changing slightly and his voice warming almost to the boiling point of nitrogen. It was obvious that the phrase was Dr. O'Connor's idea of a little joke, and Malone smiled politely and nodded. The scientist seemed to feel some friendliness toward Malone, though it was hard to tell for sure. But Malone had brought him some fine specimens to work with—telepaths and teleports, though human, being no more than specimens to such a very precise scientific mind—and he seemed grateful for Malone's diligence and effort in finding such fascinating objects of study.

That Malone certainly hadn't started out to find them made, it appeared, very little difference.

"Well, then," O'Connor said, returning to his normal, serious tone, "what can I do for you, Mr. Malone?"

"If you have the time, doctor," Malone said respectfully, "I'd like to talk to you for a few minutes." He had the absurd feeling that O'Connor was going to tell him to stop by after class, but the scientist only nodded.

"Your call is timed very well," he said. "As it happens, Mr. Malone, I do have a few seconds to spare just now."

"Fine," Malone said.

"I should be glad to talk with you," O'Connor said, without looking any more glad than ever.

"I'll be right there," Malone said. O'Connor nodded again, and blanked out. Malone switched off and took a deep, superheated breath of phone booth air. For a second he considered starting his trip from outside the phone booth, but that was dangerous —if not to Malone, then to innocent spectators. Psionics was by no means a household word, and the sight of Malone leaving for Nevada might send several citizens straight to the wagon. Which was not a place, he thought judiciously, for anybody to be on such a hot day.

He closed his eyes for a fraction of a second. In that time he reconstructed from memory a detailed, three-dimensional, full-color image of Dr. O'Connor's office in his mind. It was perfect in detail; he checked it over mentally and then, by a special effort of will, he gave himself the psychic push that made the transition possible.

When he opened his eyes, he was in O'Connor's office, standing in front of the scientist's wide desk. He hoped nobody had been looking into the phone booth at the instant he had disappeared; but he was reasonably sure he'd been unobserved. People didn't go around peering into phone booths, after all, and he had seen no one.

O'Connor looked up without surprise. "Ah," he said. "Sit down, Mr. Malone." Malone looked around for the chair, which was an uncomfortably straight-backed affair, and sat down in it gingerly. Remembering past visits to O'Connor, he was grateful for even the small amount of relaxation the hard wood afforded him. O'Connor had only recently unbent

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to the point of supplying a spare chair in his office for visitors, and, apparently, especially for Malone. Perhaps, Malone thought, it was more gratitude for the lovely specimens.

Malone still felt uncomfortable, but tried bravely not to show it. He felt slightly guilty, too, as he always did when he popped into O'Connor's office without bothering to stay space-bound. By law, after all, he knew he should check in and out at the main gate of the huge, ultra-top-secret government reservation whenever he visited Yucca Flats. But that meant wasting a lot of time and going through a lot of trouble. Malone had rationalized it out for himself that way, and had got just far enough to do things the quick and easy way, and not quite far enough to feel undisturbed about it. After all, he told himself grimly, anything that saved time and trouble increased the efficiency of the FBI, so it was all to the good.

He swallowed hard. "Dr. O'Connor—" he began.

O'Connor looked up again. "Yes?" he said. He'd had plenty of practice in watching people appear and disappear, between Malone and the specimens Malone had brought him; he was beyond surprise or shock by now.

"I came here to talk to you," Malone began again.

O'Connor nodded, a trifle impatiently. "Yes," he said. "I know that."

"Well—" Malone thought fast. Presenting the case to O'Connor was impossible; it was too complicated, and it might violate governmental secrecy somewhere along the line. He decided to wrap it up in a hypothetical situation. "Doctor," he said, "I know that all the various manifestations of the *psi* powers were investigated and named long before responsible scientists became interested in the subject."

"That," O'Connor said with some reluctance, "is true." He looked sad, as if he wished they'd waited on naming some of the psionic manifestations until he'd been born and started investigating them. Malone tried to imagine a person doing something called O'Connorizing, and decided he was grateful for history.

"Well, then—" he said.

"At least," O'Connor cut in, "it is true in a rather vague and general way. You see, Mr. Malone, any precise description of a psionic manifestation must wait until a metalanguage has grown up to encompass it; that is, until understanding and knowledge have reached the point where careful and accurate description can take place."

"Oh," Malone said helplessly. "Sure." He wondered if what O'Connor had said meant anything, and decided that it probably did, but he didn't want to know about it.

"While we have not yet reached that point," O'Connor said, "we are approaching it in our experiments. I am hopeful that, in the near future—"

"Well," Malone cut in desperately, "sure. Of course. Naturally."

Dr. O'Connor looked miffed. The temperature of the room seemed to

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drop several degrees, and Malone swallowed hard and tried to look ingratiating and helpful, like a student with nothing but A's on his record.

Before O'Connor could pick up the thread of his sentence, Malone went on: "What I mean is something like this. Picking up the mental activity of another person is called telepathy. Floating in the air is called levitation. Moving objects around is psychokinesis. Going from one place to another instantaneously is teleportation. And so on."

"The language you use," O'Connor said, still miffed, "is extremely loose. I might go so far as to say that the statements you have made are, essentially, meaningless as a result of their lack of rigor."

Malone took a deep breath. "Dr. O'Connor," he said, "you know what I mean, don't you?"

"I believe so," O'Connor said, with the air of a king granting a pardon to a particularly repulsive-looking subject in the lowest income brackets.

"Well, then," Malone said. "Yes or no?"

O'Connor frowned. "Yes or no what?" he said.

"I" Malone blinked. "I meant, the things have names," he said at last. "All the various psionic manifestations have names."

"Ah," O'Connor said. "Well. I should say." He put his fingertips together and stared at a point on the white ceiling for a second. "Yes," he said at last.

Malone breathed a sigh of relief. "Good," he said. "That's what I wanted to know." He leaned forward. "And if they all do have names," he went on, "what is it called, when a large group of people are forced to act in a certain manner?"

O'Connor shrugged. "Forced?" he said.

"Forced by mental power," Malone said.

There was a second of silence.

"At first," O'Connor said, "I might think of various examples: the actions of a mob, for example, or the demonstrations of the Indian Rope Trick, or perhaps the sale of a useless product through television or through other advertising." Again his face moved, ever so slightly, in what he obviously believed to be a smile. "The usual name for such a phenomenon is 'mass hypnotism,' Mr. Malone," he said. "But that is not, strictly speaking, a *psi* phenomenon at all. Studies in that area belong to the field of mob psychology; they are not properly in my scope." He looked vastly superior to anything and everything that was outside his scope. Malone concentrated on looking receptive and understanding.

"Yes?" he said.

O'Connor gave him a look that made Malone feel he'd been caught cribbing during an exam, but the scientist said nothing to back up the look. Instead, he went on: "I will grant that there may be an amplification of the telepathic faculty in the normal individual in such cases."

"Good," Malone said doubtfully.

"Such an amplification," O'Connor went on, as if he hadn't heard,

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"would account for the apparent . . . ah . . . mental linkage that makes a mob appear to act as a single organism during certain periods of . . . ah . . . stress." He looked judicious for a second, and then nodded. "However," he said, "other than that, I would doubt that there is any psionic force involved."

Malone spent a second or two digesting O'Connor's reply. "Well," he said at last, "I'm not sure that's what I meant. I mean, I'm not sure I meant to ask that question." He took a breath and decided to start all over. "It's not like a mob," he said, "with everybody all doing the same thing at the same time. It's more like a group of men, all separated, without any apparent connections between any of the men. And they're all working toward a common goal. All doing different things, but all with the same objective. See?"

"Of course I do," O'Connor said flatly. "But what you're suggesting—" He looked straight at Malone. "Have you had any experience of this . . . phenomenon?"

"Experience?" Malone said.

"I believe you have had," O'Connor said. "Such a concept could not have come to you in a theoretical manner. You must be involved with an actual situation very much like the one you describe."

Malone swallowed. "Me?" he said.

"Mr. Malone," O'Connor said. "May I remind you that this is Yucca Flats? That the security checks here are as careful as anywhere in the world? That I, myself, have top-security clearance for my special projects? You do not need to watch your words here."

"It's not security," Malone said. "Anyhow, it's not only security. But things are pretty complicated."

"I assure you," O'Connor said, "that I will be able to understand even events which you feel are complex."

Malone swallowed again, hard. "I didn't mean—" he started.

"Please, Mr. Malone," O'Connor said. His voice was colder than usual. Malone had the feeling that he was about to take the extra chair away. "Go on," O'Connor said. "Explain yourself."

Malone took a deep breath. He started with the facts he'd been told by Burris, and went straight through to the interviews of the two computer-secretary technicians by Boyd and Company.

It took quite a while. By the time he had finished, O'Connor wasn't looking frozen any more; he'd apparently forgotten to keep the freezer coils running. Instead, his face showed frank bewilderment, and great interest. "I never heard of such a thing," he said. "Never. Not at any time."

"But—"

O'Connor shook his head. "I have never heard of a psionic manifestation on that order," he said. It seemed to be a painful admission. "Something that would make a random group of men co-operate in that manner—why, it's completely new."

"It *is*?" Malone said, wondering if,

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when it was all investigated and described, it might be called O'Connorizing. Then he wondered how anybody was going to go about investigating it and describing it, and sank even deeper into gloom.

"Completely new," O'Connor said. "You may take my word." Then, slowly, he began to brighten again, with all the glitter of newly-formed ice. "As a matter of fact," he said, in a tone more like his usual one, "Mr. Malone, I don't think it's possible."

"But it happened," Malone said. "It's still happening. All over."

O'Connor's lips tightened. "I have given my opinion," he said. "I do not believe that such a thing is possible. There must be some other explanation."

"All right," Malone said agreeably. "I'll bite. What is it?"

O'Connor frowned. "Your levity," he said, "is uncalled-for."

Malone shrugged. "I didn't mean to be—" he paused. "Anyhow, I didn't mean to be funny," he went on. "But I would like to have another idea of what's causing all this."

"Scientific theories," O'Connor said sternly, "are not invented on the spur of the moment. Only after long, careful thought—"

"You mean you can't think of anything," Malone said.

"There must be some other expla-

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nation," O'Connor said. "Naturally, since the facts have only now been presented to me, it is impossible for me to display at once a fully constructed theory."

Malone nodded slowly. "O.K.," he said. "Have you got any hints, then? Any ideas at all?"

O'Connor shook his head. "I have not," he said. "But I strongly suggest, Mr. Malone, that you recheck your data. The fault may very well lie in your own interpretations of the actual facts."

"I don't think so," Malone said.

O'Connor grimaced. "I do," he said firmly.

Malone sighed, very faintly. He shifted in the chair and began to realize, for the first time, just how uncomfortable it really was. He also felt a little chilly, and the chill was growing. That, he told himself, was the effect of Dr. O'Connor. He no longer regretted wearing his hat. As a matter of fact, he thought wistfully for a second of a small, light overcoat.

O'Connor, he told himself, was definitely not the warm, friendly type.

"Well, then," he said, conquering the chilly feeling for a second, "maybe there's somebody else. Somebody who knows something more about psionics, and who might have some other ideas about—"

"Please, Mr. Malone," O'Connor said. "The United States Government would hardly have chosen me had I not been uniquely qualified in my field."

Malone sighed again. "I mean . . . maybe there are some books on the subject," he said quietly, hoping he sounded tactful. "Maybe there's something I could look up."

"Mr. Malone." The temperature of the office, Malone realized, was definitely lowering. O'Connor's built-in freezer coils were working overtime, he told himself. "The field of psionics is so young that I can say, without qualification, that I am acquainted with everything written on the subject. By that, of course, I mean scientific works. I do not doubt that the American Society for Psychical Research, for instance, has hundreds of crackpot books which I have never read, or even heard of. But in the strictly scientific field, I must say that—"

He broke off, looking narrowly at Malone with what might have been concern, but looked more like discouragement and boredom.

"Mr. Malone," he said, "are you ill?"

Malone thought about it. He wasn't quite sure, he discovered. The chill in the office was bothering him more and more, and as it grew he began to doubt that it was all due to the O'Connor influence. Suddenly a distinct shudder started somewhere in the vicinity of his shoulders and rippled its way down his body.

Another one followed it, and then a third.

"Me?" Malone said. "I'm . . . I'm all right."

"You seem to have contracted a chill," O'Connor said.

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A fourth shudder followed the other three.

"I . . . guess so," Malone said. "I d-d . . . I do s-seem to be r-r-rather chilly."

O'Connor nodded. "Ah," he said. "I thought so. Although a chill is certainly odd at seventy-two degrees Fahrenheit." He looked at the thermometer just outside the window of his office, then turned back to Malone. "Pardon me," he said. "Seventy-one point six."

"Is . . . is that all it is?" Malone said. Seventy-one point six degrees, or even seventy-two, hardly sounded like the broiling Nevada desert he'd expected.

"Of course," O'Connor said. "At nine o'clock in the morning, one would hardly expect great temperatures. The desert becomes quite hot during the day, but cools off rapidly; I assume you are familiar with the laws covering the system."

"Sure," Malone said. "S-sure."

The chills were not getting any better. They continued to travel up and down his body with the dignified regularity of Pennsylvania Railroad commuter trains.

O'Connor frowned for a second. It was obvious that his keen scientific eye was sizing up the phenomenon, and reporting events to his keen scientific brain. In a second or less, the keen scientific brain had come up with an answer, and Dr. O'Connor spoke in his very keenest scientific voice.

"I should have warned you," he said, without an audible trace of regret. "The answer is childishly simple, Mr. Malone. You left Washington at noon."

"Just a little before noon," Malone said. Remembering the burning sun, he added: "High noon. Very high."

"Just so," O'Connor said. "And not only the heat was intense; the humidity, I assume, was also high."

"Very," Malone said, thinking back. He shivered again.

"In Washington," O'Connor said, "it was noon. Here it is nine o'clock, and hardly as warm. The atmosphere is quite arid, and about twenty degrees below that obtaining in Washington."

Malone thought about it, trying to ignore the chills. "Oh," he said at last. "And all the time I thought it was you."

"What?" O'Connor leaned forward:

"Nothing," Malone said hastily.

"My suggestion," O'Connor said, putting his fingertips together again, "is that you take off your clothes, which are undoubtedly damp, and—"

Naturally, Malone had not brought any clothes to Yucca Flats to change into. And when he tried to picture himself in a spare suit of Dr. O'Connor's, the picture just wouldn't come. Besides, the idea of doing a modified strip-tease in, or near, the O'Connor office was thoroughly unattractive.

"Well," he said slowly, "thanks a lot, doctor, but no thanks. I really have a better idea."

"Better?" O'Connor said.

"Well, I—" Malone took a deep breath and shut his eyes.

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He heard Dr. O'Connor say: "Well, Mr. Malone—good-by. And good luck."

Then the office in Yucca Flats was gone, and Malone was standing in the bedroom of his own apartment, on the fringes of Washington, D. C.

IV

He walked over to the wall control and shut off the air-conditioning in a hurry. He threw open a window and breathed great gulps of the hot, humid air from the streets. In a small corner at the back of his mind, he wondered why he was grateful for the air he had suffered under only a few minutes before. But that, he reflected, was life. And a very silly kind of life, too, he told himself without rancor.

In a few minutes he left the window, somewhat restored, and headed for the shower. When it was running nicely and he was under it, he started to sing. But his voice didn't sound as much like the voice of Lauritz Melchior as it usually did, not even when he made a brave, if foolhardy stab at the Melchior accent. Slowly, he began to realize that he was bothered.

He climbed out of the shower and started drying himself. Up to now, he thought, he had depended on Dr. Thomas O'Connor for edifying, trustworthy and reasonably complete information about psionics and *psi* phenomena in general. He had looked on O'Connor as a sort of living version of an extremely good edition of the *Britannica,* always available for reference.

And now O'Connor had failed him. That, Malone thought, was hardly fair. O'Connor had no business failing him—particularly when there was no place else to go.

The scientist had been right, of course, Malone knew. There was no other scientist who knew as much about psionics as O'Connor, and if O'Connor said there were no books, then that was that: there were no books.

He reached for a drawer in his dresser, opened it and pulled out some underclothes, humming tunelessly under his breath as he dressed. If there was no one to ask, he thought, and if there were no books—

He stopped with a sock in his hand, and stared at it in wonder. O'Connor hadn't said there were no books. As a matter of fact, Malone realized, he'd said exactly the opposite.

There were books. But they were "crackpot" books. O'Connor had never read them. He had, he said, probably never even heard of many of them.

"Crackpot" was a fighting word to O'Connor. But to Malone it had all the sweetness of flattery. After all, he'd found telepaths in insane asylums, and teleports among the juvenile delinquents of New York. "Crackpot" was a word that was rapidly ceasing to have any meaning at all in Malone's mind.

He realized that he was still staring at the sock, which was black with a gold clock. Hurriedly, he put it on, and finished dressing. He reached for

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the phone and made a few fast calls, and then teleported himself to his locked office in FBI Headquarters, on East Sixty-ninth Street in New York. He let himself out, and strolled down the corridor. The agent-in-charge looked up from his desk as Malone passed, blinked, and said: "Hello, Malone. What's up now?"

"I'm going prowling," Malone said. "But there won't be any work for you, as far as I can see."

"Oh?"

"Just relax," Malone said. "Breathe easy."

"I'll try to," the agent-in-charge said, a little sadly. "But every time you show up, I think about that wave of red Cadillacs you started. I'll never feel really secure again."

"Relax," Malone said. "Next time it won't be Cadillacs. But it might be spirits, blowing on ear-trumpets. Or whatever it is they do."

"Spirits, Malone?" the agent-in-charge said.

"No, thanks," Malone said sternly. "I never drink on duty." He gave the agent a cheery wave of his hand and went out to the street.

The Psychical Research Society had offices in the Ravell Building, a large structure composed mostly of plate glass and anodyzed aluminum that looked just a little like a bright blue, partially transparent crackerbox that had been stood on end for purposes unknown. Having walked all the way down to this box on Fifty-sixth Street, Malone had recovered his former sensitivity range to temperature and felt pathetically grateful for the coolish sea breeze that made New York somewhat less of an unbearable Summer Festival than was normal.

The lobby of the building was glittering and polished, as if human beings could not possibly exist in it. Malone took an elevator to the sixth floor, stepped out into a small, equally polished hall, and hurriedly looked off to his right. A small door stood there, with a legend engraved in elegantly small letters. It said:

The Psychical Research Society
Push

Malone obeyed instructions. The door swung noiselessly open, and then closed behind him.

He was in a large square-looking room which had a couch and chair set at one corner, and a desk at the far end. Behind the desk was a brass plate, on which was engraved:

The Psychical Research Society
Main Offices

To Malone's left was a hall that angled off into invisibility, and to the left of the desk was another one, going straight back past doors and two radiators until it ran into a right-angled turn and also disappeared.

Malone took in the details of his surroundings almost automatically, filing them in his memory just in case he ever needed to use them.

One detail, however, required more than automatic attention. Sitting behind the desk, her head just below the brass plaque, was a redhead. She was, Malone thought, positively beautiful. Of course, he could not see the

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lower two-thirds of her body, but if they were half as interesting as the upper third and the face and head, he was willing to spend days, weeks or even months on their investigation. Some jobs, he told himself, feeling a strong sense of duty, were definitely worth taking time over.

She was turned slightly away from Malone, and had obviously not heard him come in. Malone wondered how best to announce himself, and regretfully gave up the idea of tiptoeing up to the girl, placing his hands over her eyes, kissing the back of her neck and crying: "Surprise!" It was elegant, he felt, but it just wasn't right.

He compromised at last on the old established method of throat-clearing to attract her attention. He was sure he could take it from there, to an eminently satisfying conclusion.

He tiptoed on the deep-pile rug right up to her desk.

And the expected happened.

He sneezed.

The sneeze was loud and long, and it echoed through the room and throughout the corridors. It sounded to Malone like the blast of a small bomb, or possibly a grenade. Startled himself by the volume of sound he had managed to generate, he jumped back.

The girl had jumped, too—but her leap had been straight upward, about an inch and a half. She came down on her chair and reached up a hand. The hand wiped the back of her neck with a slow, lingering motion of complete loathing. Then, equally slowly, she turned.

"That," she said in a low, sweet voice, "was a dirty trick."

"It was an accident," Malone said.

She regarded Malone darkly. "Do you always do that to strangers? Is it some new sort of perversion?"

"I have never done such a thing before," Malone said sternly.

"Oh," the girl said. "An experimenter. Avid for new sensations. Probably a jaded scion of a rich New York family." She paused. "Tell me," she said. "Is it fun?"

Malone opened his mouth, but nothing came out. He shut it, thought for a second and then tried again. He got as far as: "I—" before Nemesis overtook him. The second sneeze was even louder and more powerful than the first had been.

"It must be fun," the girl said acidly, producing a handkerchief from somewhere and going to work on her face. "You just can't seem to wait to do it again. Would it do any good to tell you that the fascination with this form of greeting is not universal? Or don't you care?"

Malone said, goaded, "I've got a cold."

"And you feel you should share it with the world," the girl said. "I quite understand. Tell me, is there anything I can do for you? Or has your mission been accomplished?"

"My mission?" Malone said.

"Having sneezed twice at me," the girl said, "do you now feel satisfied? Will you vanish softly and silently away? Or do you want to sneeze at somebody else?"

"I want the President of the So-

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ciety," Malone said. "According to my information, his name is Sir Lewis Carter."

"And if you sneeze at him," the girl said, "yours is going to be mud. He isn't much on novelty."

"I—"

"Besides which," she said, "he's extremely busy. And I don't think he'll see you at all. Why don't you go and sneeze at somebody else? There must be lots of people who would consider themselves honored to be noticed, especially in such a startling way. Why don't you try and find one somewhere? Somewhere very far away?"

Malone was beyond speech. He fumbled for his wallet, flipped it open and showed the girl his identification.

"My, my," she said. "And hasn't the FBI anything better to do? I mean, can't you go and sneeze at counterfeiters in their lairs, or wherever they might be?"

"I want to see Sir Lewis Carter," Malone said doggedly.

The girl shrugged and picked up the phone on her desk. It was a blank-vision device, of course; many office intercoms were. She dialed, waited and then said: "Sir Lewis, please." Another second went by. Then she spoke again. "Sir Lewis," she said, "this is Lou, at the front desk. There's a man here named Malone, who wants to see you."

She waited a second. "I don't know what he wants," she told the phone. "But he's from the FBI." A second's pause. "That's right, the FBI," she said. "All right, Sir Lewis. Right away." She hung up the phone and turned to watch Malone warily.

"Sir Lewis," she said, "will see you. I couldn't say why. But take the side corridor to the rear of the suite. His office has his name on it, and I won't tell you you can't miss it because I have every faith that you will. Good luck."

Malone blinked. "Look," he said. "I know I startled you, but I didn't mean to. I—" He started to sneeze, but this time he got his own handkerchief out in time and muffled the explosion slightly.

"Good work," the girl said approvingly.

There was nothing at all to say to that remark, Malone reflected as he wended his way down the side corridor. It seemed endless, and kept branching off unexpectedly. Once he blundered into a large open room filled with people at desks. A woman who seemed to have a great many teeth and rather bulbous eyes looked up at him. "Can I help you?" she said in a fervent whine.

"I sincerely hope not," Malone said, backing away and managing to find the corridor once more. After what seemed like a long time, and two more sneezes, he found a small door which was labeled in capital letters:

THE PSYCHICAL RESEARCH SOCIETY
SIR LEWIS CARTER
PRESIDENT

Malone sighed. "Well," he muttered, "they certainly aren't hiding

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anything." He pushed at the door, and it swung open.

Sir Lewis was a tall, solidly-built man with a kindly expression. He wore gray flannel trousers and a brown tweed jacket, which made an interesting color contrast with his iron-gray hair. His teeth were clenched so firmly on the bit of a calabash pipe with a meerschaum bowl that Malone wondered if he could ever get loose. Malone shut the door behind him, and Sir Lewis rose and extended a hand.

Malone went to the desk and reached across to take the hand. It was firm and dry. "I'm Kenneth Malone," Malone said.

"Ah, yes," Sir Lewis said. "Pleased to meet you; always happy, of course, to do whatever I can for your FBI. Not only a duty, so to speak, but a pleasure. Sit down. Please do sit down."

Malone found a chair at the side of the desk, and sank into it. It was soft and comfortable. It provided such a contrast to O'Connor's furnishings that Malone began to wish it was Sir Lewis who was employed at Yucca Flats. Then he could tell Sir Lewis everything about the case.

Now, of course, he could only hedge and try to make do without stating very many facts. "Sir Lewis," he said, "I trust you'll keep this conversation confidential."

"Naturally," Sir Lewis said. He removed the pipe, stared at it, and replaced it.

"I can't give you the full details," Malone went on, "but the FBI is presently engaged in an investigation which requires the specialized knowledge your organization seems to have."

"FBI?" Sir Lewis said. "Specialized investigation?" He seemed pleased, but a trifle puzzled. "Dear boy, anything we have is at your disposal, of course. But I quite fail to see how you can consider us—"

"It's rather an unusual problem," Malone said, feeling that that was the understatement of the year. "But I understand that your records go back nearly a century."

"Quite true," Sir Lewis murmured.

"During that time," Malone said, "the Society investigated a great many supposedly supernatural or supernormal incidents."

"Many of them," Sir Lewis said, "were discovered to be fraudulent, I'm afraid. The great majority, in fact."

"That's what I'd assume," Malone said. He fished in his pockets, found a cigarette and lit it. Sir Lewis went on chewing at his unlit pipe. "What we're interested in," Malone said, "is some description of the various methods by which these frauds were perpetrated."

"Ah," Sir Lewis said. "The tricks of the trade, so to speak?"

"Exactly," Malone said.

"Well, then," Sir Lewis said. "The luminous gauze, for instance, that passes for ectoplasm; the various methods of table-lifting; control of the ouija board—things like that?"

"Not quite that elementary," Malone said. He puffed on the cigarette, wishing it was a cigar. "We're pretty

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much up to that kind of thing. But had it ever occurred to you that many of the methods used by phony mind-reading acts, for instance, might be used as communication methods by spies?"

"Why, I believe some have been," Sir Lewis said. "Though I don't know much about that, of course; there was a case during the First World War—"

"Exactly," Malone said. He took a deep breath. "It's things like that we're interested in," he said, and spent the next twenty minutes slowly approaching his subject. Sir Lewis, apparently fascinated, was perfectly willing to unbend in any direction, and jotted down notes on some of Malone's more interesting cases, murmuring: "Most unusual, most unusual," as he wrote.

The various types of phenomena that the Society had investigated came into the discussion, and Malone heard quite a lot about the Beyond, the Great Summerland, Spirit Mediums and the hypothetical existence of fairies, goblins and elves.

"But, Sir Lewis—" he said.

"I make no claims personally," Sir Lewis said. "But I understand that there is a large and somewhat vocal group which does make rather solid-sounding claims in that direction. They say that they have seen fairies, talked with goblins, danced with the elves."

"They must be very unusual people," Malone said, understating heavily.

"Oh," Sir Lewis said, without a that it goes through Accounting."

Talk like this passed away nearly a half hour, until Malone finally felt that it was the right time to introduce some of his real questions. "Tell me, Sir Lewis," he said, "have you had many instances of a single man, or a small group of men, controlling the actions of a much larger group? And doing it in such a way that the larger group doesn't even know it is being manipulated?"

"Of course I have," Sir Lewis said. "And so have you. They call it advertising."

Malone flicked his cigarette into an ashtray. "I didn't mean exactly that," he said. "Suppose they're doing it in such a way that the larger group doesn't even suspect that manipulation is going on?"

Sir Lewis removed his pipe and frowned at it. "I may be able to give you a little information," he said slowly, "but not much."

"Ah?" Malone said, trying to sound only mildly interested.

"Outside of mob psychology," Sir Lewis said, "and all that sort of thing, I really haven't seen any record of a case of such a thing happening. And I can't quite imagine anyone faking it."

"But you have got some information?" Malone said.

"Certainly," Sir Lewis said. "There is always spirit control."

"Spirit control?" Malone blinked.

"Demonic intervention," Sir Lewis said. "'My name is Legion,' you know."

Sir Lewis Legion, Malone thought confusedly, was a rather unusual

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name. He took a breath and caught hold of his revolving mind. "How would you go about that?" he said, a little hopelessly.

"I haven't the foggiest," Sir Lewis admitted cheerfully. "But I will have it looked up for you." He made a note. "Anything else?"

Malone tried to think. "Yes," he said at last. "Can you give me a condensed report on what is known—and I mean *known*—on telepathy and teleportation?"

"What you want," Sir Lewis said, "are those cases proven genuine, not the ones in which we have established fraud, or those still in doubt."

"Exactly," Malone said. If he got no other use out of the data, it would provide a measuring-stick for the Society. The general public didn't know that the government was actually using psionic powers, and the Society's theories, checked against actual fact, would provide a rough index of reliability to use on the Society's other data.

But spirits, somehow, didn't seem very likely. Malone sighed and stood up.

"I'll have copies made of all the relevant material," Sir Lewis said, "from our library and research files. Where do you want the material sent? I do want to warn you of its bulk; there may be quite a lot of it."

"FBI Headquarters, on Sixty-ninth Street," Malone said. "And send a statement of expenses along with it. As long as the bill's within reason, don't worry about itemizing; I'll see that it goes through Accounting."

Sir Lewis nodded. "Fine," he said. "And, if you should have any difficulties with the material, please let me know. I'll always be glad to help."

"Thanks for your co-operation," Malone said. He went to the door, and walked on out.

He blundered back into the same big room again, on his way through the corridors. The bulbous-eyed woman, who seemed to have inherited a full set of thirty-two teeth from each of her parents, gave him a friendly if somewhat crowded smile, but Malone pressed on without a word. After a while, he found the reception room again.

The girl behind the desk looked up. "How did he react?" she said.

Malone blinked. "React?" he said.

"When you sneezed at him," she said. "Because I've been thinking it over, and I've got a new theory. You're doing a survey on how people act when encountering sneezes. Like Kinsey."

This girl—Lou something, Malone thought, and with difficulty refrained from adding "Gehrig"—had an unusual effect, he decided. He wondered if there were anyone in the world she couldn't reduce to paralyzed silence.

"Of course," she went on, "Kinsey was dealing with sex, and you aren't. At least, you aren't during business hours." She smiled politely at Malone.

"No," he said helplessly, "I'm not."

"It is sneezing, then," she said. "Will I be in the book when it's published?"

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"Book?" Malone said, feeling more and more like a rather low-grade moron.

"The book on sneezing, when you get it published," she said. "I can see it now—the Case of Miss X, a Receptionist."

"There isn't going to be any book," Malone said.

She shook her head. "That's a shame," she said. "I've always wanted to be a Miss X. It sounds exciting."

"X," Malone said at random, "marks the spot."

"Why, that's the sweetest thing that's been said to me all day," the girl said. "I thought you could hardly talk, and here you come out with lovely things like that. But I'll bet you say it to all the girls."

"I have never said it to anybody before," Malone said flatly. "And I never will again."

The girl sighed. "I'll treasure it," she said. "My one great moment. Good-by, Mr. . . . Malone, isn't it?"

"Ken," Malone said. "Just call me Ken."

"And I'm Lou," the girl said. "Good-by."

An elevator arrived and Malone ducked into it. Louie? he thought. Louise? Luke? Of course, there was Sir Lewis Carter, who might be called Lou. Was he related to the girl?

No, Malone thought wildly. Relations went by last names. There was no reason for Lou to be related to Sir Lewis. They didn't even look alike. For instance, he had no desire whatever to make a date with Sir Lewis Carter, or to take him to a glittering nightclub. And the very idea of Sir Lewis Carter sitting on the Malone lap was enough to give him indigestion and spots before the eyes.

Sternly, he told himself to get back to business. The elevator stopped at the lobby and he got out and started down the street, feeling that consideration of the Lady Known As Lou was much more pleasant. After all, what did he have to work with, as far as his job was concerned?

So far, two experts had told him that his theory was full of lovely little holes. Worse than that, they had told him that mass control of human beings was impossible, as far as they knew.

And maybe it was impossible, he told himself sadly. Maybe he should just junk his whole theory and think up a new one. Maybe there was no psionics involved in the thing at all, and Boyd and O'Connor were right.

Of course, he had a deep-seated conviction that psionics was somewhere at the root of everything, but that didn't necessarily mean anything. A lot of people had deep-seated convictions that they were beetles, or that the world was flat. And then again, murderers often suffered as a result of deep-seated convictions.

On the other hand, maybe he had invented a whole new psionic theory—or, at least, observed some new psionic facts. Maybe they would call the results Maloneizing, instead of O'Connorizing. He tried to picture a man opening a door and saying: "Come out quick—Mr. Frembits is Maloneizing again."

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It didn't sound very plausible. But, after all, he did have a deep-seated conviction. He tried to think of a shallow-seated conviction, and failed. Didn't convictions ever stand up, anyhow, or lie down?

He shook his head, discovered that he was on Sixty-ninth Street, and headed for the FBI headquarters. His convictions, he had found, were sometimes an expression of his precognitive powers; he determined to ride with them, at least for a while.

By the time he came to the office of the agent-in-charge, he had figured out the beginnings of a new line of attack.

"How about the ghosts?" the agent-in-charge asked as he passed.

"They'll be along," Malone said. "In a big bundle, addressed to me personally. And don't open the bundle."

"Why not?" the agent-in-charge asked.

"Because I don't want the things to get loose and run around saying *Boo!* to everybody," Malone said brightly, and went on.

He opened the door of his private office, went inside and sat down at the desk there. He took his time about framing a thought, a single, clear, deliberate thought:

Your Majesty, I'd like to speak to you.

He hardly had time to finish it. A flash of color appeared in the room, just a few feet from his desk. The flash resolved itself into a tiny, grandmotherly-looking woman with a coro-

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na of white hair and a kindly, twinkling expression. She was dressed in the full court costume of the First Elizabethan period, and this was hardly surprising to Malone. The little old lady believed, quite firmly, that she was Queen Elizabeth I, miraculously preserved over all these centuries. Malone, himself, had practically forgotten that the woman's real name was Rose Thompson, and that she had only been alive for sixty-five years or so. For most of that time, she had been insane.

For all of that time, however, she had been a genuine telepath. She had been discovered during the course of Malone's first psionic case, and by now she had even learned to teleport by "reading" the process in Malone's mind.

"Good afternoon, Sir Kenneth", she said in a regal, kindly voice. She was mad, he knew, but her delusion was nicely kept within bounds. All of her bright world hinged on the single fact that she was unshakably certain of her royalty. As long as the FBI catered to that notion—which included a Royal dwelling for her in Yucca Flats, and the privilege of occasionally knighting FBI Agents who had pleased her unpredictable fancy—she was perfectly rational on all other points. She co-operated with Dr. O'Connor and with the FBI in the investigation of her psionic powers, and she had given her Royal word not to teleport except at Malone's personal request.

"I'd like to talk to you," Malone said, "Your Majesty."

There was an odd note in the Queen's voice, and an odd, haunted expression on her face. "I've been hoping you'd ask me to come," she said.

"I had a hunch you were following me telepathically," Malone said. "Can you give me any help?"

"I . . . I really don't know," she said. "It's something new, and something . . disturbing. I've never come across anything like it before."

"Like what?" Malone asked.

"It's the—" She made a gesture that conveyed nothing at all to Malone. "The . . . the static," she said at last.

Malone blinked. "Static?" he said.

"Yes," she said. "You're not telepathic, so I can't tell you what it's really like. But . . . well, Sir Kenneth, have you ever seen disturbance on a TV screen, when there's some powerful electric output nearby? The bright, senseless snowstorms, the meaningless hash?"

"Sure," Malone said.

"It's like that," she said. "It's a . . . a sudden, meaningless, disturbing blare of telepathic energy."

The telephone rang once. Malone ignored it.

"What's causing these disturbances?" he asked.

She shook her head. "I don't know, Sir Kenneth. I don't know," she said. "I can't pick up a person's mind over a distance unless I know him—and I can't see what's causing this at all. It's . . frankly, Sir Kenneth, it's rather terrifying."

The phone rang again.

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"How long have you been experiencing this disturbance?" Malone asked. He looked at the phone.

"The telephone isn't important," Her Majesty said. "It's only Sir Thomas, calling to tell you he's arrested three spies, and that doesn't matter at all."

"It doesn't?"

"Not at all," Her Majesty said. "What does matter is that I've only been picking up these flashes since you were assigned to this new case, Sir Kenneth. And—" She paused.

"Well?" Malone said.

"And they only appear," Her Majesty said, "when I'm tuned to *your* mind!"

TO BE CONTINUED

IN TIMES TO COME

Next month we have Poul Anderson back with another yarn—"The Longest Voyage."

There's been a lot of discussion of Relativity in science fiction . . . but there is, perhaps, an inadequate appreciation of the fact that distance itself is relative. Relative, actually, to the technology that is available to cover it. Is it far from here to China? Is it a long voyage from New York to San Francisco?

Well, that's relative. If you're walking, it's a long way, but really it's only about two hours by jet. (Air Corps type, not airlines type!)

Then there's the longest voyage of all. The voyage that starts at a barbaric campfire and moves all the long, long way to automatic machines . . .

THE EDITOR

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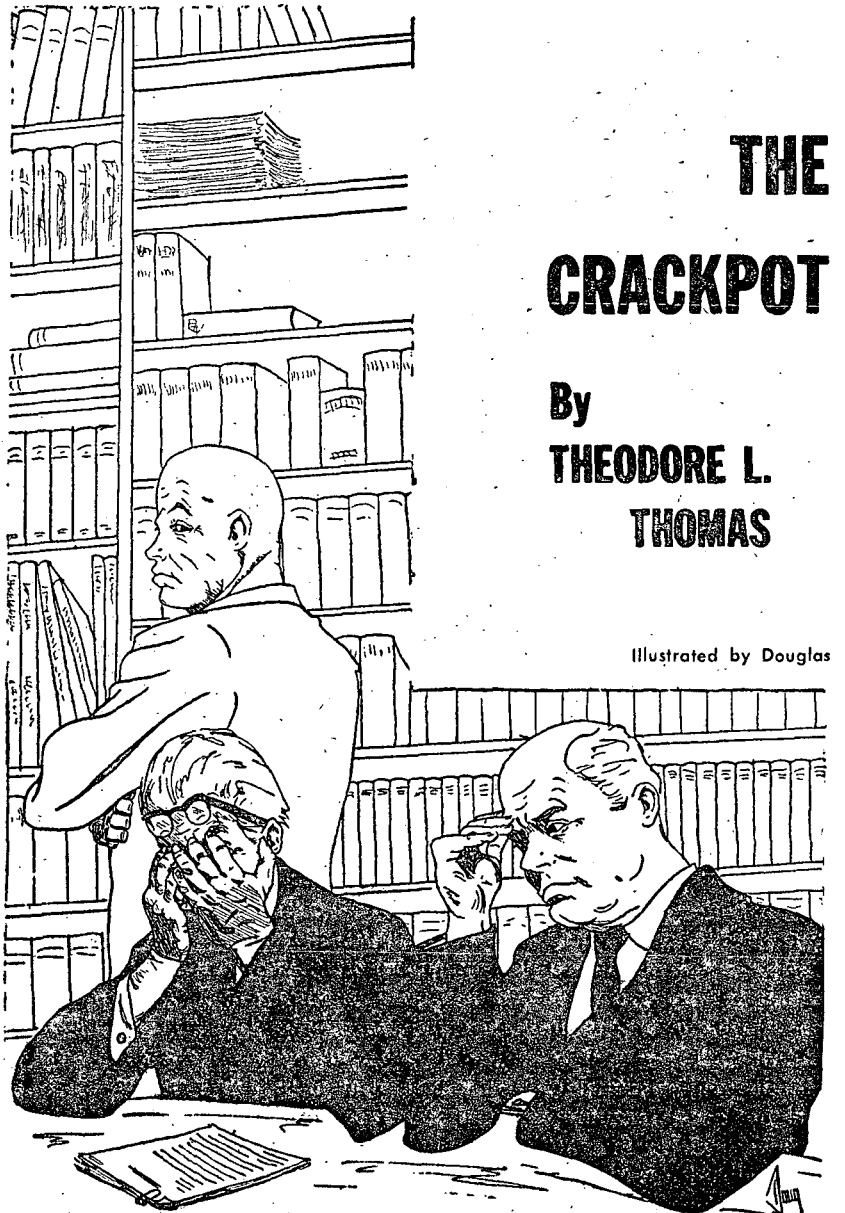

THE CRACKPOT

By THEODORE L. THOMAS

Illustrated by Douglas

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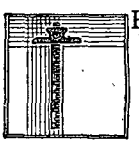
A crackpot is, frequently, a man who is intelligent, but not wise. And sometimes a truly wise man knows it's time to join the psychoceramic department . . .



THE handshake that shook the world took place in the Muncey Building in Washington, D. C. over a stack of the strangest patent applications ever to grace the desk of a startled patent attorney. Dr. Bertrand R. Singlestone, physicist and cosmologist, was acting perfectly normal at the time, which would have been a surprise to just about everybody in the country who read a newspaper or watched TV. Later, when they thought about it, they decided that the first signs of senility of Dr. Bertrand Singlestone occurred at the June budget meeting of the University. Dr. Singlestone was there to present his annual battle for more funds, and the Board of Directors was there to see that no one got one thin dime more than was necessary. The Chairman of that meeting was Dr. Sylvester W. Cantwater, a suave man who gave the impression he was doing everyone a favor by simply being there.

"Now, Dr. Singlestone," said Dr. Cantwater, "we agree to all your figures on the continuation of your plasma research. I'm certain the Board will agree to supply the necessary funds. Agreed?" He did not look up at the other six members. "All right. The next four items deal with your continuing research into the nature of the low temperature molecular bonding forces. These are all under government contract, so we need not concern ourselves; there are no University funds involved. Then—"

Dr. Singlestone interrupted. "I think we should reconsider carrying out this work under government contract. Not only must we give up all rights in our results, but the government refuses to release any of our findings. For all we know our work is being duplicated in other laboratories. Another thing. We are making significant progress; there is a break-through in the offing. My people want to feel they are adding to the general fund of scientific knowledge instead of adding to the contents of a locked filing cabinet

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somewhere in the Pentagon. Let's do the work for ourselves, then the University can publish and patent and talk about the work all we want. All of us—"

"No. There is no sense in using University funds if other funds are available. You, of all people, Dr. Singlestone, one of the most fruitful of the government inventors, shouldn't complain."

Dr. Singlestone snorted, "Government inventor, my foot. Everything under a secrecy order, closed, restricted, keep out. These fatheads have forgotten that the very meaning of the word patent is 'open'."

Old Charlie Potter spoke up. "I think Bertie is right. Get out from under these government contracts and do the work on our own. We don't—"

Dr. Cantwater started to say, "Now, let's not—"

"Don't interrupt me, Shorty," said Potter, sitting up straighter in his chair. Dr. Cantwater turned livid at the "Shorty," as Potter knew he would. Potter was a master at the in-fighting that took place around a conference table, despite his round, kindly face and his deceptively gentle manner. "While you watch the money you're wasting the University's most important assets—creative brains. In Bertie Singlestone here you've got the country's outstanding cosmologist and physicist, and what do you do? You let the government semi-scientists milk him into a locked filing cabinet, like he says. We got others around here almost as good, like me, for instance. But half of my chemists are tied up in this polyurethane solid fuel project, and we can't even tell the other half what we are doing."

It was Chester Grant who headed off the developing argument. Grant was on the Board of Directors of four industrial corporations and a bank, and he was president of the Alabama School of Agriculture. It was an open secret that he hoped to be appointed Secretary of Agriculture after the next election. Grant said to Potter, "All right, Charlie. You want to let us get on here, or do you want to put this to a vote now." It was blunt talk from a politician, but Grant spoke from strength and he knew it. Along with Cantwater and three others, he swung a comfortable majority on the University's Board, dedicated to the proposition that the only good government is a big government that sees all, knows all, and controls all.

Wise old Charlie Potter scanned the Board without seeming to do so, and he caught the slight shake of the head from Singlestone. In the homey casual manner possible only to an old man who has seen and done everything he said, "Oh my, no. I just make the point that we shouldn't lose sight of the best interests of our own people and our own University." It was a good retreat.

Dr. Cantwater had recovered his usual supercilious manner. He said, "To continue with this Singlestone budget request, if we may, I note an item for thirty-five thousand dollars to cover the salaries of four new physicists to be added to the staff

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during the year, but I don't see any justification for them. There should be a detailed—"

"The appendix, doctor. Look in the appendix, Section F of my budget request contains the details you want." Dr. Singlestone shook his great shock of white hair.

The Board members dutifully thumbed into their copies of Singlestone's budget request until they found what they wanted. Things fell quiet as they read. Grant looked up and said, "Looks all right to me but I think four is too many. A man of Dr. Singlestone's accomplishments says he needs more men, he gets them. But I think two is enough."

"I'll approve two," said Dr. Cantwater, and the others nodded.

"I vote against any," said Charlie Potter, and he and Singlestone winked at each other, two old fellows goading the pompous young squirts. The money was approved.

"Now this last item," said Dr. Cantwater, "you made any justification for it anywhere?"

"No," said Dr. Singlestone. "I'd like that money to fool around with some ideas I have."

Grant snapped at him. "A quarter of a million dollars to 'fool around'? You think money grows on trees."

Potter snapped back. "Bertie wants to fool around, you let him if you know what's good for the University." He was about to add more, a great deal more, when he caught again that shake of the head from Singlestone, and he quieted, wondering what on earth was wrong with Bertie. Usually Bertie liked nothing better than a good tussle with these scientific ignoramuses, but not today.

Dr. Cantwater said, "No one could have any higher regard for the scientific ability of Dr. Singlestone than the members of this Board. Nevertheless we are placed here to watch over the funds of the University, and we cannot pass out money without good reason even to such an eminent person as Dr. Singlestone. We must refuse this money to you Dr. Singlestone, unless you can justify it. Can you?"

And then, then it happened.

Dr. Bertrand Singlestone, physicist extraordinary, twice winner of the Franklyn Medal, three times winner of the Charles B. Dudley Medal, winner of the Hoover Medal and the Washington Award, this man, hung his head and rubbed a forefinger on the polished table top and said, "I want it. I just want it that's all. I want it and you give it to me. You must give it to me, you must, you must." And he dropped his head so his forehead pressed against his wrists.

After the first shocked, wide-eyed stare the Board looked down at their papers and kept their eyes fixed there, until Singlestone looked up and said, "Do I get it? Do I? May I have it?"

They looked at him and saw that the lower half of his face was wet with tears. It was too much. Dr. Cantwater said, "Let us discuss it later. I think we'd better recess for a while." The others hastily nodded and everybody except Charlie Potter left

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the room, the Board members avoiding the door that Singlestone used.

Potter heaved himself erect and slowly walked to the seat where Singlestone had been sitting. A tiny drop of liquid lay on the smooth table top, spilled from the gelatine capsules Singlestone had surreptitiously crushed in his hands. Potter, a chemist of the old school, touched his finger tip to the drop of liquid and carefully transferred some of it to the tip of his tongue. He noisily clicked his tongue against the roof of his mouth and smacked his lips. He nodded. He slowly walked to the door muttering to himself, "Now why would Bertie act like that and smear glycerine on his face to make those idiots think he was crying?"

The laboratories of Dr. Bertrand Singlestone opened unusually early the next morning. Physicists and lab technicians went to work two hours earlier in order that the laboratories would be fully staffed when the Navy made its Monthly visit to look over the results of the research it was paying for. It was the University's idea that everyone should be working when the captain and the two commanders and the two lieutenants and the two ensigns came through on the inspection tour. Everyone, that is, except Dr. Bertrand Singlestone himself, and no one at the University had ever tried to turn him out at such an hour. "Not me," he said. "The only thing the Navy does well is get up early in the morning, and I have no intention of helping them with it. I'll come in when I get ready."

Dr. Singlestone arrived at the lab at ten fifteen a.m. By that time the scientists and the Naval officers had finished swapping the latest stories —sacred and profane—over three gallons of coffee and four dozen sweet buns, had decided what was wrong with the way the Army and the Air Force ran their respective research programs, had agreed on the short-sighted salary policies of the Armed Services and were almost ready to go to work.

For these inspections the laboratories were always in a most unusual posture: the areas devoted to secret work were thrown wide open for inspection, while the areas devoted to the normal unclassified work were kept closed and restricted. It had cost Dr. Singlestone four patents and at least a dozen publications to learn that that was the way it had to be when he carried out research for the government. If the government inspection team saw the unclassified work, the team tried to assert that at least some of the work was really an offshoot of government work. Since it was an offshoot of government work it obviously came under the government contract, and so the government owned all patents and everything else connected with it.

On one occasion Dr. Singlestone had litigated the Defense Department's right to an assignment of a patent covering work exceedingly remote from that under the contract. Dr. Singlestone had won, too; the

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judge had ordered the Department to reassign the patent to Dr. Singlestone, and he had used some scathing language to do it. But the suit had cost Dr. Singlestone four years of time and seventy-five thousand dollars in money, and it was hard to say which hurt the most. The patent became obsolete six months after the judgment. So Dr. Singlestone allowed the government inspection teams only into those top secret areas where their own work was done.

With the amenities out of the way, the Naval inspection team was about ready to go. The lieutenants checked their automatic pencils with the little blue Annapolis seals at the top, and they pulled out their tooled leather notebooks with the Annapolis seal on the front. The ensigns nervously shifted from foot to foot. Finally the captain led off. A laboratory scientist fell in beside each officer, and the procession began moving from lab to lab.

In each lab the senior technologist stepped forward to show the inspection team the work being done in that particular area. Soon the notebooks were being filled, and the questions were being batted around like ping-pong balls. An air of eagerness spread over the team, for this visit, like all the visits to the Singlestone University laboratories was proving extremely fruitful. Problem after problem was falling apart under the skillful attack of the Singlestone scientists, and everywhere could be seen and felt the touch of the master himself. It was, therefore, with great delight that the inspection team suddenly found Dr. Singlestone among them, and a most unusual Dr. Singlestone at that. He was smiling and effusively friendly, displaying none of his usual reluctance to talk to military people.

"Are you seeing everything?" asked Dr. Singlestone.

"Why . . . why . . . why yes, doctor, thank you. Thank you very much," said the captain.

"That's fine. That's fine. We have some interesting work going on. For example, in here—" And Dr. Singlestone threw open a door to an unclassified lab just as if secret work under a military contract were going on there. Quick to see an unexpected windfall, the officers flooded through the door and into the lab, almost running down the thin, gray-haired woman in charge. Dr. Singlestone, pushed aside for a moment, worked his way to the front of the eager group and started to speak. But after one quick look around the various officers had each headed for the part of the lab that appealed to him; they scattered like quicksilver dropped on a marble floor. Dr. Singlestone wandered over to a greasy, makeshift piece of equipment and said half to himself, "Yes, the wireless power transmission rig is working well."

There was the squish of swift-moving rubber-shod feet on the wooden floor, and as if by magic a circle of officers surrounded Dr. Singlestone and the piece of mangy-looking equipment. Built in two

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parts it was, mounted on separate tables with a three-foot gap between the two parts. As if unaware of the silent circle around him, Dr. Singlestone reached out and threw a switch on one of the two halves of the equipment. A flywheel began to revolve, and immediately its counterpart on the other half also began to revolve for no apparent reason.

The captain said to Dr. Singlestone, "What did you say this was?"

In an absent-minded way Dr. Singlestone said, "Oh, this rig illustrates a new technic of wireless power transmission I'm working out. I may be able to transmit better than two thousand watts over a hundred miles with no cables or wires. I seem to have here the answer to Technical Problem Number 657 of the National Inventor's Council. It looks as though it works." He fell silent, as if thinking.

The notebook pages rapidly filled with sketches and verbal descriptions, and wide-eyed officers thrust their arms into the space between the two rotating flywheels to insure that there was no physical connection between them. Excitement crackled in the air as the officers drank in the sight. It was a bright-eyed young ensign who noticed it.

He reached out to the side of the apparatus that seemed to have no power input. He dug his fingernail into a thin groove on the wooden supporting surface and pulled out a loop of a small insulated wire. He stared at it, and then pulled some more and traced the wire a full ten feet to the point where it plugged into a socket on a lab bench. For a long moment the officers stared at the system while their minds adjusted to the fact that it was a fraud; *both* sides of the rig were connected to a source of power. They then looked unbelievingly at Dr. Singlestone. The good doctor hung his head and shuffled his feet and sort of grinned a little at the floor. A stern look came over the captain's face and he made ready to talk to Dr. Singlestone. But the good doctor turned and headed out the door, head hanging low, feet dragging and shuffling. The officers slowly went out after him, giving him time to get well ahead. The inspection tour continued, but its spirit was different now.

The gray-haired woman stepped up the rig and looked at the small insulated wire. "Funny," she said. "If Bertie wanted to kid them along, why did he try to conceal a white-coated wire in a black groove?"

The Haddon Hall Hotel in Atlantic City is one of the finest in the city. During conventions of the American Chemical Society the Haddon Hall Hotel was the one in which the most significant events took place; it was there that the most illustrious scientific names presented their papers. On the second day of the convention there was to be presented a paper entitled "Interacting Gravitational Fields and the Creation of Hydrogen." In view of the subject and the author the Program Commit-

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tee had scheduled that meeting in the Grand Ball Room, although with some misgivings; no matter how significant the subject or learned the author, the Grand Ball Room was a big place to fill.

The Committee need not have worried. Reservations ran slightly ahead of expectations up to a week before the talk, and then they skyrocketed. It seems there were some rumors flying around about the author, the learned physicist and cosmologist Dr. Bertrand R. Singlestone—something about a nervous breakdown at a Board meeting at the University, and something about a fudged experiment—an actual attempt at fraud—on some important work for the Navy. Unbelievable, of course, but it might be well to look in on the great man and see how he comports himself. And so there was not even standing room in the Grand Ball Room when Dr. Singlestone got to his feet, stared out at the heavy artillery of the scientific world, and began to talk.

The talk started with the beautifully simple background description that was the hallmark of a Singlestone lecture. The sweep and majesty of the great gravitational fields came alive in some of the most lucid prose ever heard at the presentation of a scientific paper. In fact, the charm and beauty of the words tended to conceal the subject matter under discussion. The talk was half an hour old before a few of the more objective listeners realized that Dr. Singlestone was equating interacting gravitational fields with a sentient being having all the attributes of the Creator. In a few more minutes even the dull minds in the audience could not ignore the fact that Dr. Singlestone was wrapping science and theology into one neat package.

The audience sat in shocked silence. One of the reporters for a prominent technical journal started to slip from the room, and then thought better of it when he realized there was more coming. The lecture swiftly evolved into a dissertation on the creation of hydrogen by a great reasoning being which was itself formed from the interaction of interstellar gravitational fields. There was even a brief mathematical treatment of eddying in the fields to prove that the sentient being would thereby be formed in a shape very much like that of a man. On that note the lecture ended, leaving the audience staring, the people not yet daring to look at one another.

Dr. Singlestone left through the curtains behind the lectern before anyone could recover sufficiently to follow. Pandemonium in the Grand Ball Room was slow in coming, but come it did, and it spread to the other hotels and the entire Convention and onto front pages all over the country. The event received such notoriety that the porter who had carried Dr. Singlestone's bag aboard the train out of Atlantic City that morning recognized the doctor's picture in the paper that afternoon. "My," he said. "If he did all those bad things they say he did, why was

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he laughing so much when I put him on the train this morning?"

The Board of Directors of the University met again exactly one week after the budget meeting, only this time Dr. Singlestone was not present. "I don't know," said Dr. Cantwater. "This can only bring harm to the University. I think we ought to give him a pension and retire him."

Old Charlie Potter, his white hair standing on end, began to raise a fist to crash down on the table top, but Chester Grant got in his licks first. "You retire Dr. Singlestone over my dead body. The man may have turned into a crackpot, but he still has the finest record of accomplishment this country has seen in a long while. The great American public will not stand for us to push him around, so you just let him alone. All his laboratories are running smoothly, are they not?" There was a nod of general agreement. "Well then, you just let him stay around. Charlie"—"he turned to Charlie Potter—"you can keep an eye on old Bertie for us and keep him out of trouble, can't you?"

Potter was so pleasantly surprised at Grant that he almost said something niee to him, but he caught himself in time. "Bertie needs no one to keep him out of trouble, and I'll thank you not to refer to him as a crackpot. However, I'll keep seeing him as I always do, so you need have no concern for the University."

Grant said to the Chairman, "That all right, Dr. Cantwater?"

Dr. Cantwater nodded, and all the other Board members did, too. The meeting adjourned.

The Willard Hotel in Washington, D. C. is practically across the street from the United States Patent Office, and it is just down the block from the Muncey Building. It is, therefore, ideally located for anybody who goes to Washington on patent business. Dr. Bertrand Singlestone checked in at the Willard five days after his notorious lecture in Atlantic City. It was evening, and the desk clerk was discreet and pretended he did not recognize the tall, gaunt man with the great shock of white hair. After a dinner of fried shrimp at O'Donnell's, Dr. Singlestone went back to his room and spent the next four hours working over a thick sheaf of papers covered with drawings, equations, and narrative. Then he went to bed.

Promptly at nine o'clock the next morning Dr. Singlestone walked through the door of the Muncey Building office of Edwin H. Daffinger, patent attorney. The receptionist showed him into the inner office and introduced him to Mr. Daffinger. The two men looked at each other in open appraisal, and each liked what he saw. Mr. Daffinger was a short man, slow to speak, with the habit of choosing his words carefully. A stubbornly non-conforming forelock gave him a pert, inquisitive appearance. The two men shook hands, and Mr. Daffinger indicated a chair and said, "Please sit down, Dr. Singlestone, and tell me how I can be of service."

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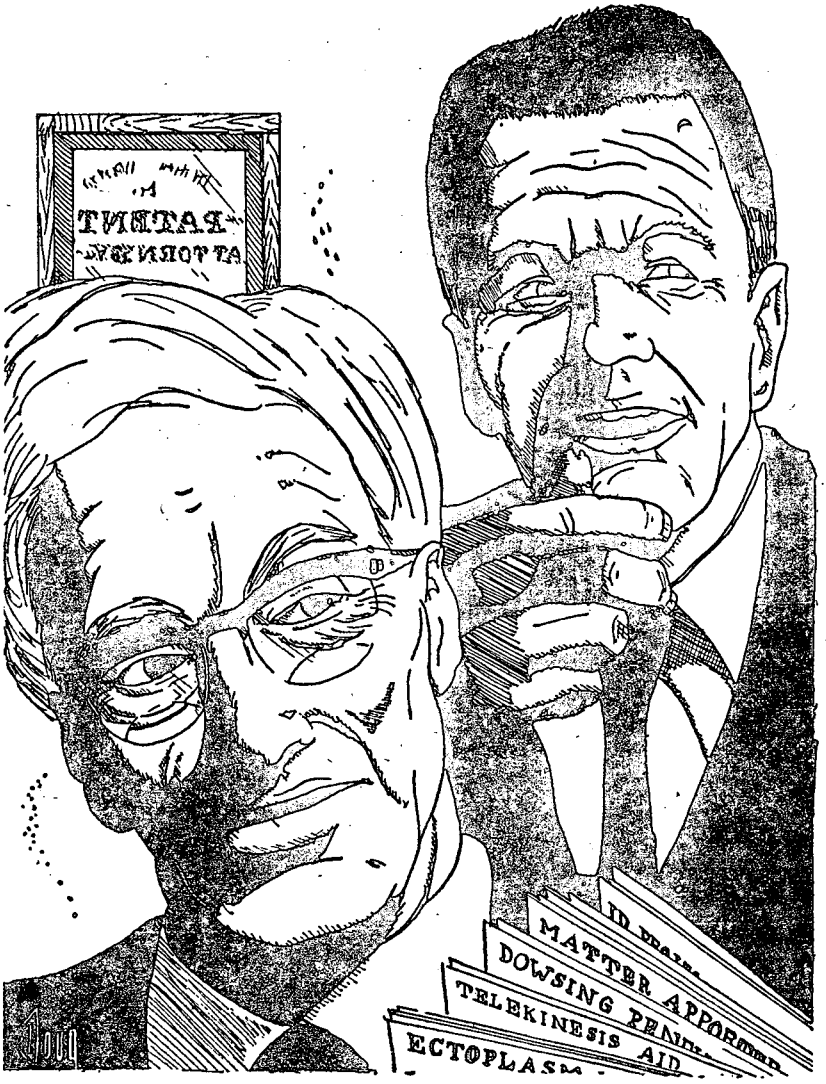
As soon as he was seated, Dr. Singlestone said, "I am considering filing a series of patent applications and I want you to handle them."

Mr. Daffinger nodded. "Why did you come to me, doctor? Your work has always been done by the New York firm of White and Sobert when the government patent attorneys aren't doing it."



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Dr. Singlestone considered how to answer that question, and decided there was no use trying to hedge with this man. "I need a capable attorney who has a reputation for handling screwball patents. I've read some of the patents you've written and screwball or not, you do a good job. I also know that you are the local representative for Standard Oil of Florida."

Mr. Daffinger smiled. "You've looked me up pretty thoroughly. Not many people know that."

"Will you take me on as a client?"

"Have you told me everything you care to?"

"Yes, unless you feel there are other things you have to know. Oh, there is one thing. If agreeable to you, I would want you to help me try to sell these inventions to the government."

At this Mr. Daffinger looked straight at Dr. Singlestone and said, "Help you? Why should a Dr. Bertrand Singlestone need help in selling inventions to the government? It snaps up everything you do."

"Yes. Well, I doubt that it will snap up any of these." Dr. Singlestone passed to Mr. Daffinger a list of the inventions he had in mind.

Mr. Daffinger glanced down the list, whistled, and then read it aloud: "Id Projector, Dowsing Pendulum, Matter Apporter, Telekinesis Aid, Ectoplasm Detector, Mind Reading Device. Yes, sir, Dr. Singlestone, this is quite a list of inventions. The only thing missing is a perpetual motion machine."

Dr. Singlestone laughed. "I have one, and I think people would have a hard time finding out what is wrong with it, too. I almost put it on that list of patent applications I want filed, but then I remembered something. Wouldn't the Patent Office raise the roof with any patent attorney who prepared and filed an application for a perpetual motion machine?"

"Probably would. Might even try to disbar me. But with a scientist of your reputation as the inventor, I think we could have a lot of fun; we could stand the Office on its ear."

"That's exactly the spirit I hoped to find here. Let's wait until after we finish up with this series. That is, if you will take me on as a client."

Mr. Daffinger studied the list, pulling at a small scar on his upper lip. "Would you have any objection if I insert in every one of these patent applications a paragraph pointing out that the invention can be used as an amusement device?"

Dr. Singlestone hesitated and said, "Would such a paragraph hurt one of the patents—if you got it allowed—if the patent really did what it says it does?"

"Not at all," said Mr. Daffinger, and he glanced at Dr. Singlestone with an I-thought-so Look. Dr. Singlestone caught the look and correctly interpreted it; and felt pleased; he knew he had come to the right place. This Daffinger was a quick-thinking man.

Mr. Daffinger stood up and thrust

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out his right hand. Dr. Singlestone stood up and took it. And thus was born the working relationship that was destined to shake the world.

The two men spent the rest of the morning together. They went out to lunch at Ceres, and then back to work for the rest of the afternoon. By early evening they had worked through a series of secretaries and had accumulated a large pile of notes and a thick stack of sketches. Dr. Singlestone had never worked with a patent attorney who had so much to contribute to the polishing and rounding out of an inventive concept. They parted in the early evening, with another meeting set up one week away.

Dr. Singlestone spent the intervening week back at the University supervising in his usual skillful manner his various research programs. None of his associates mentioned the strange behavior of the past few weeks, and there was certainly nothing wrong with his present behavior, except for one trivial idiosyncrasy. Dr. Singlestone always seemed to be wearing his glasses upside down when he ran into a member of the Board of Directors of the University. This was a most disconcerting thing. A single glance at the good doctor sufficed to show that something was very wrong with his appearance, but it took close scrutiny to determine exactly what it was. Discovery of the upside-down glasses was always followed by a shocked stare, a hasty turning away of the head, and an embarrassed silence on the part of the Board member. Dr. Singlestone's colleagues never saw the glasses in such a position, and so there was never an occasion to comment on them.

Part of the week was spent in writing a series of lectures to various Federal agencies informing them of the impending filing of a series of patent applications which he, Dr. Singlestone, considered to be very important both to science and to the welfare of the country. The letters all carefully omitted the titles of any of the applications, but they stated that the titles would be supplied if the agency was interested in acquiring an interest in them at a price.

At the end of the week Mr. Daffinger and Dr. Singlestone met again in Mr. Daffinger's offices. They checked over the six patent applications very carefully, and then Dr. Singlestone signed the formal papers. A secretary carried them over to the Patent Office and filed them that day. Dr. Singlestone turned over to Mr. Daffinger copies of the letter that had gone forward to the various Federal Agencies, and the two men mapped out further details of the selling campaign to interest the government in the six inventions. It was Mr. Daffinger who spotted a flaw in their plan.

"I think we ought to ring in the Congress on this, too, instead of confining our attention to the agencies; let's offer the inventions to the legislative branch of the government as well as the executive. No one later

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one can accuse us of playing politics by making the Administration look foolish."

Dr. Singlestone nodded. "That is right. Let's add the Senate and the House Space Committees to our list, and any others that might be interested."

With this agreed on, they parted, each to do his part of the work. Mr. Daffinger wrote letters, held interviews, and generally made a nuisance of himself on behalf of his client who was doing an excellent job of making a nuisance of himself on his own behalf. The two of them became known in the office of every bureaucrat in the government who had any connection, however remote, with "national defense," as it is called. Any officer of any of the Armed Services of any importance learned to blanch at the mere mention of one of their names. To make matters worse, every meeting was preceded by several letters explaining what the meeting was to be about, and was followed by several letters making of record all that had happened at the meeting. These were then followed by a series of additional letters requesting reconsideration.

While all this was happening, Mr. Daffinger was diligently prosecuting the patent applications. When the Patent Office mailed out an Office Action in one of the applications, Mr. Daffinger sat right down and responded to it without waiting for the usual six months to expire. On several occasions Mr. Daffinger conducted interviews with the Examiners in charge of the particular application and twice he emphasized the fact that the invention concerned was useful as an amusement device. Once, with the Id Projector Case, he had to set up a demonstration.

At one point, early in the campaign, Dr. Singlestone almost spoiled it. He had arranged for an interview with an old friend, Dr. William T. Harkness, now Administrator of the National Aeronautics and Space Administration. At the meeting Dr. Singlestone had turned over to Dr. Harkness copies of the six patent applications and had urged that the Administrator acquire an interest in all the inventions, or any one of them.

Without looking at the titles of the applications, Dr. Harkness began joshing Dr. Singlestone. "Why, Bertie, I thought all you inventors were down on the NASA. You fellows all say that Section 305 of the Act strips you of all your property rights in inventions. Yet here you are trying to sell them to us. My, how times have changed." The tone was bantering, covering the slight embarrassment resulting from Dr. Singlestone's recent conduct in Atlantic City. Then Dr. Harkness looked down at the heap of patent applications and thumbed through them. He looked up, annoyed, and said, "What is this Bertie? Some kind of joke? Look, we're both too busy for this kind of thing." He pointed to a pile of papers on one side of his desk.

It was while Dr. Harkness looked

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at the pile of papers that Dr. Singlestone made his mistake. Seeing that the offer of the patent applicaions was not having quite the desired effect, Dr. Singlestone decided to augment the crackpot impression he hoped to give, and so he quickly turned his glasses upside down. When Dr. Harkness looked at him again, there was the usual perplexed stare, the usual shock of discovering what was wrong, but none of the usual embarrassed looking away. Instead, the annoyance disappeared from Dr. Harkness' face, and he stared sharply and suspiciously at Dr. Singlestone and said, "What are you up to, Bertie?"

Dr. Singlestone's blood ran cold at that. This man could ruin the whole scheme. Dr. Singlestone never thought faster in his life than he did at that moment. He smiled easily, reversed his glasses and placed them properly on his nose. He said, "Just trying to soften you up a little, Bill. I can use some extra cash, so I thought your group might be interested in these inventions. Your predecessors always snapped up my work in the past."

The suspicion was fading. "They never snapped up anything like these." He touched the six patent applications. "You aren't seriously urging that we buy these things, are you?"

"Certainly. It is time the National Aeronautics and Space Administration quit plodding along and did a little blue-sky research for a change." And then Dr. Singlestone had an even worse scare. Dr. Harkness nodded and thoughtfully looked again through the stack of patent applications. Frantically Dr. Singlestone wondered what to say, realizing that he had said nothing right so far. He decided to name a fat price for the applications, and just caught himself in time as he was about to name a ridiculously high figure; that would make Harkness suspicious all over again. He said, "You can have them at ten thousand dollars apiece, or all six for fifty thousand dollars."

As soon as he said it Dr. Singlestone saw that at last he had made the right move. With an expression of distaste Dr. Harkness put down the applications and said, "Oh, come now, Bertie. I could never justify that kind of money, even for your blue-sky research."

"Well, that's it, Bill. That's the money I need. Take it or leave it."

"I'll leave it."

Dr. Singlestone got up and said, "Well, I won't take up any more of your time. Thanks for listening to me, Bill. Give my best to Madge." They shook hands.

Safely out in the hall, Dr. Singlestone wiped the sweat from his face and reflected on the closeness of disaster. Later, in Mr. Daffinger's office, he recounted the situation, and the two of them took a lesson from it. They learned early in the game that here and there in the government was an occasional intelligent man who was able to think clearly and boldly, unencumbered by group thinking. Thereafter they acted more

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cautiously, always on the lookout for that rare, intelligent man or woman.

For two years the game continued. The name of Dr. Bertrand Singlestone faded from the public eye; people mentioned it with a sorrowful shake of the head, comparing the man with another great scientist who had gone wrong, Sir Oliver Lodge. The University pretended that Dr. Singlestone was not really there. The Armed Services shifted their research contracts elsewhere. And things were calm and quiet the Tuesday on which the six patent applications finally issued as patents. Things remained calm for the next five days while Mr. Daffinger and Dr. Singlestone quietly negotiated with certain banking interests who swiftly formed a non-incorporated association bearing the name Startime Research Associates. Certain arrangements were made, and on the sixth day the announcements were made.

Five of the six patents had been licensed to a manufacturer of crystal balls, seance tables, and astrology charts. But the sixth was retained by the Associates for exploitation due to the fact that the patent covered a real, operable, fully developed, and functioning matter transmitter. The arrangement made by the hard-headed banking group was straightforward: Dr. Bertrand Singlestone was to receive a flat twenty-five miillion dollars payable over a five-year period for the outright sale of the patent to the Associates, plus appointment as Director of Research for the Associates with a guaranteed yearly budget of five million dollars to be spent on research on any subjects Dr. Singlestone's whim might select, the research to be carried out at the University where there were a great many bright-eyed graduate students available, and where Mr. Daffinger would function as Manager of Patents.

The announcement was made early on a Monday morning. By noon the good word had spread via newspapers and interrupted radio and TV programs. The communications center set up by the Associates began to hum as calls began coming in from interested parties. By two o'clock recriminations began to fly: the agencies and the Armed Services and Congressional committees began looking for somebody to blame for the fact that the government was not the exclusive owner of the matter apporter.

Item: the Senate Judiciary Committee attempted to force the Government Printing Office to seize the patent copies and hold them, only to find that the Associates had already received and distributed several thousand copies, mostly to newspapers, and the corresponding patent had been issued a year earlier in Belgium, France, Italy and Luxembourg, and was about to issue in forty-six additional foreign countries.

Item: the House Armed Services Committee issued a flat statement accusing Dr. Singlestone and the Associates of lack of patriotism in using the invention for personal gain in-

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stead of turning it over to the United States Government as an aid in the defense effort, whereupon the Associates released copies of correspondence with eighteen agencies and eight Congressional Committees including the Armed Services Committee all turning down the opportunity to acquire the invention for the exclusive use of the government.

Item: Dr. Sylvester W. Cantwater issued a statement to the TV cameras reasserting the University's respect and admiration for this outstanding scientist on its staff who had long had the full and complete support and confidence of the University, the statement being interrupted when a white-haired, old gentleman stepped into the camera's view, said "Hogwash."

Item: on a nationwide TV hookup, Dr. Singlestone walked off camera in New York and walked on camera two seconds later in San Francisco and then reappeared on camera in Atlanta and explained that the matter apporter, operating as it did by changing a frame of reference, consumed very little power, to be exact, one watt per pound per thousand miles, and he held up in one hand the battery that had powered his trip from New York to San Francisco to Atlanta.

Item: by late afternoon most daily newspapers the world over had gleefully reprinted the complete patent so that all readers would possess a detailed description of the matter apporter.

Item: the Chairman of the Joint Chiefs of Staff, one of the few intelligent men to immediately sit back and think for a few moments, realized that war as men knew it was obsolete, and so he submitted his resignation, and was promptly signed up by the Associates.

And Dr. Bertrand Singlestone happily returned to his beloved research, quite pleased with himself at having worked out a way to get unlimited research funds, without having to haggle. It was six months before he learned all over again that the mind of even a brilliant man is a frail thing, prone to error and mistakes. He had thought he was a wealthy man as a result of his deal with the Associates, but he learned he did not know what real wealth was. That manufacturer who had taken the other five patents turned out to be no slouch once he got his world-wide chain of plants in operation. He began paying to Dr. Singlestone a royalty amounting to two million dollars a month, and that was only the beginning.

THE END

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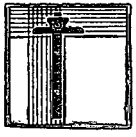
Illustrated by Gardner

THE PIEBALD HORSE

By E. C. TUBB

If you've ever spent a night worrying about something that you know isn't going to be helped a bit by thinking . . . consider the problem of a man who mustn't think of something where telepaths can "hear" . . .



HEIR scent betrayed them. It was minor, a combination of food and body odors unnoticeable to a normal man, but Brady had been equipped for the job and had the olfactory sensitivity of a dog. He crouched in the darkness of the alley, nostrils flaring as he snuffed the air. Three of them, and close, and there would be more within call.

Cautiously he slid back along the wall, two steps taking him to the door he had just left. Softly he knocked, his knuckle tapping out the signal, every sense at the alert. He was lucky. The door opened behind him and he stepped into deeper darkness. Something living moved beside him.

"Brady," he said quickly. "Lock the door."

"Something wrong?" The contact was a native, his scent acrid in Brady's nostrils. He led the way into an inner room where a dull lamp glowed on a pedestal. His crest-color, like his scent, signified fear.

"Guards outside." Grady jerked his head back the way he had come. The oddly shaped weapon in his hand centered itself on the native's waist. "Would you know anything about it?"

"No! No, I swear it!"

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He was, thought Brady, telling the truth. There was no sense or logic in the contact having sold him out and then sitting as bait in the trap. If the information he had passed over was false, then it would be to the benefit of the Ligurian Intelligence to allow him to escape with it. And there was no mistaking the native's genuine terror.

"We've got to get away from here," he babbled. "If they catch us—" His crest reflected his terror. Brady could sympathize with it. If they were caught, their end would be very long and very painful. Ligurian Intelligence were noted for the manner in which they punished any who violated their security.

"Keep calm," said Brady, he was thinking. The information he had bought was safely memorized and the papers burned. Theoretically he was inviolate once he left this area, devoid of any proof that he was other than what he seemed. And yet the rendezvous was trapped which meant that, in some way, the L.I., had been warned. Brady was certain that he had done nothing to arouse suspicion. The fault, obviously, must rest with the contact.

Logically he should kill the native, fire the house and escape in the confusion.

If the native guessed what was in his mind he gave no sign. The contact, thin, crested, wearing only an ornamented loin cloth and open tunic, moved softly about the room. It was typical of all Ligurian dwellings; cushions on the floor, ceremonial brazier burning before the shattered birth-egg, a tinkle bell hanging from the ceiling. The modern television set in one corner and the shower-spray, half-hidden behind a curtain, told of the ubiquitous impact of Terran civilization.

Brady watched him, realizing that he had underestimated the native. He had passed the apex of terror and had reverted to his normal self and, Brady remembered, anyone who could have stolen vital information from guarded files and got away with it must be above normal. Certainly far above the common herd of Liguriens, conditioned as they were to blind obedience to the dictates of a despotic government.

"We must get away from here," said Brady. "Is there another way?"

"Naturally." The native carefully wrapped the shards of his birth-egg in a cloth and then made sure his money, a great wad of local currency, was safe in a pocket of his tunic. The gesture was only too familiar. Humanity, or humanoids, thought Brady wryly, were the same the universe over. It was only the common denominator of bribery which made espionage possible between alien worlds.

"Hurry." Brady was impatient. "They won't wait out there forever."

The native grunted, rolled back a thin mat and lifted a trap set in the floor. It revealed a dark well full of noisome odors. Something small darted from the shadows, the local equivalent, Brady guessed, of a rat.

"Follow me," said the native, and

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dropped through the hole, Brady at his heels.

It was a nightmare journey of twisting turns and endless crawling. They were, Brady guessed, in an old sewer of some kind, at least it smelt like it. After what seemed a long time the native stopped. Brady bumped into him, cursed softly at the pain of the blow, then realized the other was speaking to him.

"We part here, Earthman. I go to the left, you to the right. You will come to a wall set with rungs. Climb them and lift the trap. It opens on a small yard from which you can reach the street."

"Thanks." Brady waited for the native to move. "Anything else?"

"A small thing. I have been thinking—we should not have been discovered. I took every precaution." The native hesitated. "Perhaps I should warn you. There is a rumor, I gave it no credence, that a new form of life has been recruited by our government."

"So?" Brady wasn't surprised. The galaxy was big and there were more plants uncontacted than known. It was inevitable that new races should be discovered. "What kind?"

"I do not know, not for certain, but rumor has it that they can read minds." The native moved forward. "Good-by, Earthman. Fortune go with you."

The instructions had been correct. Brady eased himself through the trap, lowered the lid and took a hasty look round. The yard was deserted though he could hear footsteps in the street. He concentrated on brushing down his clothes, fortunately the sewer had been dry and the dirt fell from the repellent plastic; a shower and they would be as good as new.

He smelt the air then, satisfied, took the weapon from his pocket. A twist and the thing fell apart; a cigarette lighter, a battery-powered pocket radio, other assorted junk, all local imports and all, if you knew just how to fix them, uniting to make an effective, short-range beamer. Disarmed, innocuous, his papers in order, he strolled from the yard and into the street. The blandness of his features belied his thoughts.

It was, as the contact had pointed out, only a rumor but Brady could not afford to ignore rumors. The galaxy was littered with odd races and the fact that, as yet, Earth had contacted no natural telepaths didn't mean there weren't any. Their value, to a security-minded planet, would be incalculable. And the rumor could be true; there was something odd about the trapping of the rendezvous, could one of the telepaths, perhaps, have caught a vagrant thought?

A shape loomed in the shadows of the street and a flashlight beam stabbed at his eyes. "What—?"

"Routine check, sir." The guard wasn't a native but a mercenary imported from a high-gravity planet. Brady would have been like a doll in his grasp. "Your papers, sir."

Brady passed them over, submitted to a thorough search, readied himself for the expected questioning.

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"Rather late for a business man to be wandering the streets?" The guard was polite but Brady wasn't fooled. "May I ask your business, sir?"

"None." Brady made a vague gesture. "Truth is that I was just walking and lost my way." He knew it wasn't enough. "I'm a little worried," he lied. "My wife, you know, she's expecting."

"Expecting?" The Guard looked blank. Even Interglacial has its translation difficulties especially to races born in a variety of ways.

"A baby." Brady detailed the reproduction cycle of the human race. "Our first, you know how it is."

The Guard didn't know and would have said more but something changed his mind. Brady's acute hearing caught the tiny buzz of the ear-radio but missed the following instructions. The Guard became brusque.

"Return to your hotel," he ordered. "Immediately."

"Sure," said Brady. He kept in character. Terrans were noted for their curiosity. "Something wrong?"

"There is a criminal at large in this area. He is known to be dangerous. It is for your own safety that you return to your hotel."

"Of course." Brady did not make the obvious mistake. "I'd be there now if I knew where it was. Can you direct me please?"

The guard directed him. Brady walked on, acutely conscious of a region in the small of his back. He had never felt quite so helpless and alone in all his life.

The Transient Hotel was, as its name implied, the natural temporary home of all off-worlders visiting Liguria. It was also, thought Brady, the logical place for any mind reader to be stationed. There and the spaceport, of course, but he would cross that bridge when he came to it. For the moment he had to concentrate on the hotel.

It rose before him, an almost new edifice of plastic and stone, the usual clutter of porters and carts outside the doors, a couple of guards glowering at them with conscious superiority. Brady took a fold of flesh between his teeth, bit down hard and, eyes watering with the pain of his self-inflicted wound, hurried through the doors and into the bar. It was, as he had hoped, fairly well crowded with an assortment of alien races. He thrust himself among a group of fellow Earthmen and ordered a drink. Sipping it he pondered his next move.

He was, he realized, in a hell of a position.

With Earth expanding among other races some resentment was inevitable. Earth was strong and had allies but Earth was also rich and bubbling with liberal ideals. Planets such as Liguria wanted the riches without running the risk of their own peoples becoming infected with Terrestrial concepts of freedom and, the obvious way to gain one without the other was by means of armed conquest. In order to survive Earth had to use every trick in the book including espionage. Unfortunately for Brady Ligurian Intelligence had taken quite

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effective steps to prevent that very thing.

Everyone was stripped to the buff and thoroughly examined before being permitted to leave the planet, and no individual was permitted to import or export any item of any nature whatsoever. The ban included personal clothing.

All radio-wave bands were garbled by a round-the-clock inteference from orbiting stations; only local radio and television line-of-sight broadcasts being possible at ground level.

A continuous watch by fast and vicious patrol craft made unauthorized landings and take-offs an impossibility.

There were other safeguards, all ingenious and all effective. Information, the Ligurians admitted, could possibly be stolen. But information is valueless unless it can be passed to the other side.

Brady had thought that he had found a way to break the system, now he wasn't so sure. An eidetic memory, on the face of it, a foolproof method —but not if the Ligurians had managed to recruit telepaths to braincheck everyone leaving the planet.

And he dared assume nothing else; the risks were too great for him to discount the rumor.

He sighed and finished his drink, the alcohol stinging his bitten cheek. He was, he thought, safe enough for the moment. It was doubtful if any telepath could isolate a thought from among this crowd and, even if they could it would be impossible to isolate the thinker. Safety, for the moment, lay in numbers, it might be his last chance to fully concentrate on the major problem.

How?

How to get off this planet and carry the memorized information to where it would do the most good? How, in other words, to beat the telepaths?

He was, Brady thought, like the man in the story who was assured that, if he saw a piebald horse, he would receive a pot of gold—if he didn't think of the horse's tail. The man, of course, didn't stand a chance. He would remember what he mustn't think about and that would make him think about it.

But, thought Brady grimly, the legendary man only stood to lose something he hadn't got while he stood to lose his life and Earth a lot more. The incentives weren't quite the same.

Solemnly he called for another drink, raised his glass and drank a silent toast to the piebald horse.

He had, Brady found, discovered a new form of torture. Last night he had hugged the safety of the bar drinking until the memorized information was lost in a soggy pool of random thoughts. The morning was different.

He had been chosen for this assignment mainly because of his retentive memory. He woke with every detail of the stolen information fresh and vivid in his conscious mind. Hastily he jumped out of bed and concentrated on washing and shaving

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half-expecting the arrival of the guards.

None came. Either he had been lucky or no telepath was on duty. He recognized the danger of the thought and desperately concentrated on the delicate filigree of the internal decorations. Nice, clean, expert carving, he thought. You didn't see much of that on Earth what with automation making the individual craftsman a thing of the past. He must find out about costs with a view to export.

The filigree occupied him the time it took to dress. His business, genuine enough which was his cover, provided something to think about on the way to breakfast. A group of Terrestrials, including a few obvious tourists, were a boon in more ways than one. He approached them, made himself pleasant, and joined them for the meal.

"Name's Meson." A portly man waved a greeting with his fork before using it to spear a portion of fish from his plate. "Industrial Adviser. Been here long?"

"Not very." Brady studied the menu, made his choice and helped himself to coffee as the native waiter moved away. "Did I see you last night?"

"I saw you." A crew-cut youngster, an engineer by the look of him, gave a broad wink. "Man, were you riding high!"

"You should have joined me."

"No thanks!" The youngster shook his head. "I'm working on atomics and for that you keep your head clear, or you don't keep it for long." He drew a finger across his throat. "Get me?"

Brady nodded. The engineer was a contract-man which meant that he could return to Earth in a few years relatively wealthy—or, if he broke his contract, could land in a Ligurian jail. Knowing the Ligurian-style contract Brady didn't envy him. Neither, apparently, did a thin-faced, scholastic looking man seated at the end of the table.

"I'm Joe Hendricks," he said. "Music is my business and fame is my aim." He grinned. "Sorry, guess alliterative lyrics are in my blood by now." He gulped at his coffee and raised his eyebrows.

Brady introduced himself. "Export and Import," he explained. "Stopping here a few days on business."

"If your business is like my business, then you ain't got any business." Hendricks bit his lip. "Damn it! You must think I'm crazy!"

Brady gave a noncommittal smile.

"Sometimes I think I must be," continued Hendricks. "Planet hopping in search of new tonal effects and native melodies most of which are just a pain is a stupid way to earn a living." He brightened. "Still, there are worse ways, like our young friend there. He doesn't know it but he's just a price-tagged slave."

"Aren't most of us?" Brady wasn't really interested in the discussion but it filled a gap. "You know, work today in order to eat tomorrow. Didn't someone call it the acme of futility?"

"Brenheart, but that guy was soured from the cradle." Hendricks shrug-

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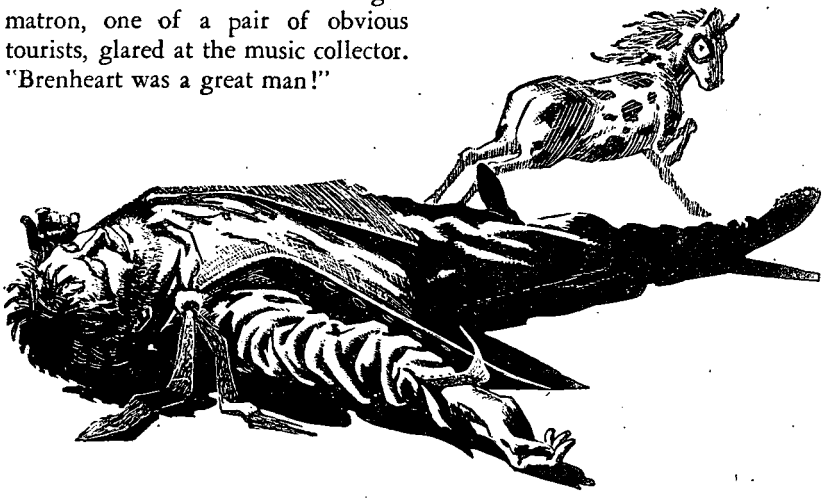
ged. "Anyway, he was a phony. He preached cynicism, 'true evaluation' he called it and died in a penthouse."

"So?"

"So he lied right along the line. He didn't evaluate himself; if he had he'd have died in the gutter where he belonged."

"That isn't true!" A middle-aged matron, one of a pair of obvious tourists, glared at the music collector. "Brenheart was a great man!"



"Sure." Hendricks waved a pacifying hand. "Anything you like, just don't let's argue about it." He looked whimsically at Brady. Brady smiled and concentrated on the tourists.

Their names, he found, were Lucy and Mary Piggot. They were sisters spending a small legacy on a selected tour of the more respectable planets.

"For culture, you know," explained Lucy. "I've always said that travel broadens the mind."

"Of course," said Brady smoothly. "I think you are both very wise."

Privately he thought the two women would have been far wiser to find out a little more about their own planet before reaching out for "culture." Being cooped up in starships with stopovers at hotels which, aside from their location, were almost all alike, was hardly the best way to broaden minds. Still, he supposed, it would be something to talk about. And, for him, they could be useful.

"Why thank you!" Lucy was flustered. This chance meeting with the taut-faced stranger would add spice to an, as yet, eventless tour. "We'd love to come. Is it far?"

"Quite near to the spaceport."

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Brady signaled to the waiter and paid both bills. He waved aside their objections. "Please, it's a pleasure. It isn't often I get the chance of fresh news from home." He smiled winningly at them. "Nor the chance of such charming company."

"But—"

"We can take a cart." He overrode their mild protestations. My business shouldn't take long and then we can tour the real, native quarter." He rose. "Shall we go?"

The area outside the doors was cluttered with the usual mass of carts plying for hire. He chose a modern one constructed of light alloy, fitted with air-suspension and balloon wheels. It was drawn by a couple of low-caste porters, naked but for their loin-cloths. Settling back in the wide seat he explained the anomaly.

"It would be simple to fit an engine but, if they did, the porters would be thrown out of employment."

"I think it's cute." Mary patted her hair and Brady was conscious of the competition between the sisters for his attention. "What brought you to Liguria, Mr. Brady?"

"Let's not talk about business," he said hastily. He did not want to be reminded of the true reason for his visit. Certain words and phrases, he had discovered, forced him to think of the one thing he was desperately trying to push back to the far regions of his subconscious.

They did not talk about business. Instead they chose to talk about something almost as bad.

"You know, I think it dreadful all this talk of trouble between the planets," babbled Lucy. She was determined to hold the conversation. "Why, there was a man on the spaceship, you didn't meet him Mary, who said there was a possibility of actual war. Do you think it possible, Mr. Brady?"

He gave her a noncommittal smile.

"You can see that Mr. Brady knows more than he cares to tell." Mary was being arch. "For all we know he could be a spy—or is it an agent?" She giggled. "You know, Lucy, all this is so exciting!"

"Exciting?" Brady raised his eyebrows.

"All the spying and espionage. Why, it seems that everyone is suspect. They even searched our rooms last light at dinner."

"That is nonsense, Mary." Lucy was firm. "They wouldn't dare to do such a thing. Why, if they did, I'd complain to our ambassador!" Her hand gripped his arm. "Mary is so foolish," she exclaimed. "I'm sure that she is entirely wrong. Perhaps you could convince her, Mr. Brady."

Brady gritted his teeth and then, by an effort of will, managed to turn the conversation into more harmless channels. But his mind, once aroused, stubbornly refused to stop thinking about his immediate problem. Grimly he stared ahead, concentrating on the smooth, seemingly effortless rhythm of the porters.

Neat how they managed to keep in such perfect step; training, naturally, but it must have taken years. He sup-

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posed they were brought up to it from early youth, given small carts to practice with, something like that.

He was earnestly wondering what their diet consisted of and how one partner would manage should his running-mate fall sick or die when they arrived at their destination.

The break was a relief. The native factor was shrewd and knew all about striking a hard bargain. Brady lost his worries in mental juggling of freight rates, import duties, taxes, margins of profit and discounts. Finally, the contract signed and the business over, came the ritual gossip.

Brady listened patiently to the state of the weather, the health of the factor's family, the never-ending cycle of increased taxation and government supervision, the third-hand tattle common to Ligurian businessmen. In return he contributed a choice item about a Wentian who had managed to sneak past the Terran embarkation authorities and who had spored while in transit; added his own complaints about increased taxes and became doleful over the prospects of trade in general. He was feeling quite relaxed when his eye glanced at the front page of a local newspaper.

"Your pardon." He picked up the sheet without waiting for permission. The photograph on the cheap pulp was smudged but recognizable. It was the native from whom he had bought the information.

"Terrible, isn't it?" The factor made vague noises at the back of his throat. "It's getting so that a man isn't safe on the streets now." He read the script beneath the photograph and shook his head. "Found dead in the gutter," he said. "The body was badly battered and bore injuries consistent with having fallen from a great height, probably the top of a nearby building." He shrugged. "Well, perhaps, but my guess is that a thug attacked him."

Brady knew better. It hadn't been suicide and it had been no thug. He hastily made his departure and rejoined the ladies in the cart. Lucy was annoyed, her tones sharp with impatience.

"Well," she said. "You certainly took your time!"

Mary was more sympathetic.

"Mr. Brady probably had a lot to talk about," she said. "Anyway, it doesn't matter. I found it most interesting just sitting here watching the people go by. I do feel that, to get to know a planet, really know it I mean, you have to go among the people. Don't you agree, Mr. Brady?"

"Certainly." Brady looked about him. Aside from the two women there were no other Terrestrials about and he had a sudden, panicky feeling of naked helplessness. He could only guess at the effective range of a telepath but, if they had any range at all, he must be as obvious as a tree in a desert. He had to get back in the woods, and fast.

"Is something the matter?" Mary, still sympathetic, leaned towards him. Brady managed a brave smile, his hands pressing his stomach.

"I feel a little off-color," he ad-

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mitted. "A touch of recurrent fever, something I picked up on Thurgid. Nothing contagious," he added hastily, "but it's rather annoying." He appeared to control a grimace of pain. "I wonder? I hate to ask it but—"

"Yes, Mr. Brady?" This time it was Lucy who was sympathetic.

"I wonder if we could go back to the hotel." He took a handkerchief from his pocket and dabbed at his forehead. "I hate to disappoint you like this but—"

"Shouldn't you see a doctor?" Lucy softened her voice. "I mean, if you are ill—"

"It's nothing, nothing serious, that is." He made more play with the handkerchief. "I've had these attacks before. I'll be all right if I just lie down for a while and sleep a little." He leaned forward, snapped orders to the porters. The cart jolted into motion and steadied into a smooth glide. To Brady it seemed to crawl.

To be safe he needed to be among others of his own kind. The natural place they would congregate would be the bar. He sat on a stool, as close to a group of gossiping contract-men as he could, ordered whisky and drank it while his mind edged at the problem. He called for another drink, left it on the counter while he crossed the room to a public visbooth. He inserted coins, adjusted the muscles of his face and dialed a number. The screen cleared and revealed a smooth, native face.

"Spaceport," the native announced. "Your pleasure, sir?"

Brady told him, his voice husky, like his features distorted beyond recognition. The clerk consulted his files.

"The next Terran departure is in seven days, sir."

"Seven days?"

"That is correct. There is a Vegan ship in two and a Wendian in five." The clerk's crest showed the color of amusement. "I doubt if you would care to travel on either of those, sir."

Brady doubted it, too. He wasn't accustomed either to sleeping in oil or breathing an atmosphere loaded with sulphureted hydrogen.

"I understood the *Solar Star* was leaving tomorrow," he said. The clerk shrugged.

"No, sir. That is the vessel departing in seven days time. A slight case of contamination," he explained. "The ship has been detained for cleansing."

"I see." Brady felt himself beginning to sweat.

"Was there any urgency, sir?"

"No. I was just asking for a friend."

Brady broke the connection and stood, staring at the empty screen, conscious of the tautness of his nerves. Deliberately he forced himself to relax, easing the muscles of his face, taking deep breaths to ease the pounding of his heart. Even if he couldn't control the workings of his mind he was still the master of his body. When he left the booth he appeared just like any other ordinary business man who had just made an ordinary, routine call.

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The bar was even more crowded than before. Little groups of men clustered at the counter and a sprinkling of women made lighter sounds in the hum of conversation. He recognized the sisters who, after one glance at him, concentrated on their fruit juice. He had, he knew, insulted them beyond forgiveness. He dismissed them from his mind as he reviewed the situation.

First the contact. Somehow the suspicion of the guards had been aroused and they had trapped the area of the rendezvous. He had escaped, the contact, obviously, hadn't. He must have been tortured to death and Ligurian Intelligence now knew that he had passed the information to an Earthman. That would account for the delayed vessel; obviously they didn't know just which Terrestrial was the one they wanted.

Brady wasn't surprised at that. He had taken elementary precautions as he had when calling the spaceport, but even so he doubted if any native could describe one Earthman from another. That wasn't the main problem.

He couldn't consciously keep remembering not to think about what he mustn't; the strain was too great. He was like the man who went around looking for a piebald horse while telling himself that he mustn't think of its tail. The very effort of not-remembering was, in itself, a danger signal.

At the hotel he was fairly safe; sheer numbers would protect him if he should slip, a telepath could hardly be expected to distinguish one mental radiation from another. The spaceport was a different story.

You went singly at the spaceport. You had to pass emigration, embarkation, health, customs, examinations and all the rest of it. For a man to pass through all that knowing he must not think of a certain thing; knowing that he must not even think about not thinking of it, wasn't going to be easy.

In fact it was going to be impossible.

Unless?

Brady felt that he could use a good hypnotist. If he could be conditioned to forget until safe in space then his problems would be over. He thought longingly of all the experts back on Earth who could tweak out an unpleasant memory, blanket an entire episode or implant false experiences without any trouble at all. But this wasn't Earth and there were no hypnotists on Liguria. Only a regular doctor attached to the spaceport who would be under constant supervision and who couldn't help even if he were qualified.

Brady sighed and ordered another drink. He had the glass to his lips, the tang of the whisky in his throat when a hand fell on his shoulder.

It was Joe Hendricks and he had been drinking. He sat on a stool next to Brady and rapped the counter. He lifted his glass and looked owlishly over the rim.

"You," he said, "look a worried man."

"Do I?"

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"You sure do." Hendricks swallowed his drink and called for another. "What's the matter chum? Girl stand you up or something?"

"Something," agreed Brady. He told Hendricks about the delayed ship departure. "The trouble is it will play hell with my schedule." He looked at Hendricks' drink, the third in almost as many minutes. "You look like a man with something on his mind, too."

"You can say that again." Joe made a grimace. "I've been trying to find something worth collecting on this planet—not a hope. Not a note, not even a couple of chords worth a second hearing. Now it seems I've got to stick here for another week." He shook his head and signaled to the bartender.

The native didn't immediately respond. He was busy serving a group of men lower down the bar. Hendricks glared at them.

"Look at them!" He snorted with contempt. "You'd think a man would do his drinking in a civilized manner, wouldn't you?"

Brady nodded.

"Not these guys! They've slipped the leash for three days and are they going to live it up!" Hendricks banged on the counter again. "I hate those guys," he said. "Wage-slaves the lot of them. Scared to step over the line in case they get hit in the pocket. Now they're on vacation they want to make up for lost time."

"Contract men?" Brady felt the stirring of alarm. "You mean they're all on vacation?"

"For three days. After that this place will look like a morgue—aside from us genuine transients, that is."

Brady took a deep breath, held it, let it slowly escape through his nose. Ligurian Intelligence were clever, he had never underestimated them, and now many things were clear. His surmise about the telepaths not being able to recognize individual thoughts from a crowd must be correct. The hotel was crowded, abnormally so, but soon it would be almost empty of Terrestrials. With the ship delayed and devoid of his camouflage, Brady wouldn't stand a chance.

"Cheer up!" Hendricks banged on the counter, swore as the flustered native bartender spilled whisky on the smooth plastic. "Take it easy, can't you!" He glowered his anger. "No appreciation," he complained to Brady. "No appreciation at all."

"No." Brady picked up his drink.

"Have another." Hendricks was hospitable. "Tell you what, let's get a bottle and have ourselves a ball."

"Take it easy." Brady toyed with his glass, his eyes speculative. "I've got a lot of thinking to do. "Rearrange my schedule," he explained. "Try and figure out some way to make up for lost time."

"Forget it." Hendricks made a gesture. "Take time out to relax."

"I'm liable to relax too far." Brady swirled the whisky in his glass. "Suppose they alter the departure time? Suppose I'm too sozzled to hear about it? What then?"

"Then you do the same as I did on Fendle." Hendricks chuckled. "Went

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on a bend there and didn't wake up until after ship-time. I had to sweat it out for a month until the next ship." He chuckled again. "It paid off though, I found three musical arrangements which are still paying me royalties."

Brady raised his eyebrows.

"I figured a system. I contact the medic and spin him a yarn and make him promise to get me to the ship even if I'm dead. Then I bribe a couple of natives to do the same. Between them I figure I'm safe."

Brady nodded, the music collector certainly had things worked out. The man must be quite a heavy drinker to have bothered about such a system. He looked at the thin face and for the first time noted the tiny mottled veins, the subtle air of dissipation.

"Well?" Hendricks was getting impatient. "Do we or don't we?"

"Do we or don't we what?"

"Have ourselves a ball. You on an expense account?" Brady nodded. "Then let's go to town. Let's get a couple of bottles and forget this hick planet."

"Make it four," said Brady.

The steward was discreet. He knocked on the cabin door, waited, knocked again. The man with him had no time for pleasantries, he reached past the steward, opened the door, walked into the cabin. He slammed shut the door and nodded towards the bed.

"How is he?"

"He'll live." The doctor made a final examination, snapped shut his instrument case, and rose to his feet. The other man pointedly opened the door, waited until he was alone with the man on the bed, sat beside the bunk.

"Well?"

"I'm dying!" Brady made weak, grouping motions. His eyes opened, focused, then, by an effort of will, cleared. "Grimsdyke!"

"In person." He looked at his wrist. "And in a hurry. Blenkin didn't seem to want to co-operate."

"Blenkin's old-fashioned," said Brady. "I guess he didn't like being boarded and his ship practically taken over by a strange man with a badge and a mysterious errand." He winced at the pain in his skull. "How about letting the medic work on me?"

"He has." Grimsdyke looked thoughtfully at the man on the bed. "You know," he said quietly, "I didn't think you'd make it. Those new playmates of the Ligurians are tough customers."

"They exist then? I'd wondered."

"They exist all right. We got to them just after our friends. True neutrals, of course, they would be."

Brady nodded. He relaxed, feeling better by the minute, partly because of his improved physical condition but mostly because he knew that, at last, he was safe. In a little while, when he felt able, he would tape the stolen information and Grimsdyke would take it by fast shuttle to where it would do the most good.

Grimsdyke lit a cigarette. He looked thoughtful.

"What I can't understand," he

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said, "is how you figured it out."

"You've heard of the piebald horse?" Brady told of the story. "You see the gimmick- You've got to remember what not to think about. To do that you've got to remember what it is you must forget. Follow?"

"I think so." Grimsdyke didn't seem too certain. "A little complicated, isn't it?"

"It's impossible." Brady helped himself to one of Grimsdyke's cigarettes. I thought of everything but nothing was any good. I thought of wearing tight shoes so that the pain would occupy my mind; of fixing an accident, something painful but not too serious, but I still had to strip naked for embarkation and it would only take one thought to give me away."

"So?"

"So nothing I could think of would work. I was just about ready to chance it being a bluff when I found the solution."

"You know," he said dreamily, "it's funny how we so often overlook the obvious. It takes a real effort of will to remember that we're up against alien minds with alien concepts of conduct." He turned on one elbow and aimed the cigarette at Grimsdyke. "What is the one thing peculiar to Terrestrials that we have never met up with in any other race?"

Grimsdyke looked blank.

"There you are!" Brady was triumphant. "You're doing it at this very moment and yet you can't recognize it."

"This?" Grimsdyke looked at his cigarette. "Smoking? But it's normal."

"Wrong." Brady spoke through a cloud of smoke. "Every *Terrestrial* does it, or almost every Terrestrial, but we are the only race who regard it as normal. In fact we are unique in being the only race of intelligent creatures who consistently poison their bodies with noxious substances such as nicotine and," he paused, "alcohol.

"I don't know why they think we do it," he continued. "Every race we've met must have their own ideas, they probably think it due to diet or something, but that isn't the point. The point is that they have no idea as to the effects of alcohol—the mental effects in particular."

"Man!" Grimsdyke looked at Brady with something like awe.

"Seven days," said Brady. "Seven days in which I got drunk and stayed drunk. Stinking, rotten, staggering drunk. So drunk that I didn't know what time of day it was; too drunk to care; too drunk to think.

"I had luck," he admitted. "I found just the right partner. How is Joe, by the way?"

"He'll live—just."

"I owe him a lot," said Brady. "He kept me so drunk that I didn't even think of the piebald horse let alone its tail. And her supplied a cast-iron alibi as well as camouflage." He sighed. "Joe is a nice guy—I hope he understands why I never want to see him again."

THE END

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Van de Graaff generator repelling a plastic sphere 425,000 volt + charge.

THE ELECTRIC FIELD ROCKET

By H. C. DUDLEY, Ph.D.*

While you can't get something for nothing, it's easy to get nothing for something. Failure to take advantage of an assist that's right there waiting is, definitely, getting nothing for something!

* Captain, MSC, U.S. Navy

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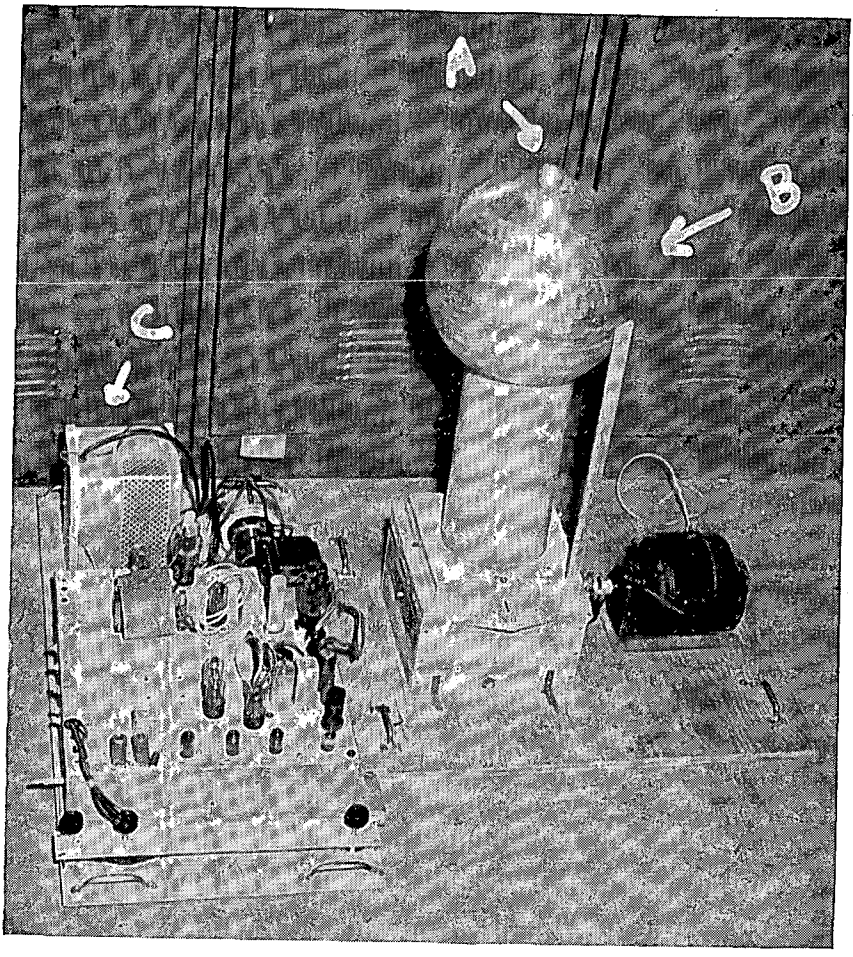

A. 1½" spheres used to study the effect of acceleration on charge of a body.

B. Collector head of Van de Graaff generator capable of being charged 425,000 volts (+) with respect to earth.

C. Electronic high voltage generator 25,000 volts (+) to ground side brush of Van de Graaff generator.

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DURING a lecture on nuclear theory, the professor explained the disintegration of uranium. At the end of the lecture he stated, "This system of mathematical theory, shows a definite probability that an airplane may pass through a rocky cliff to come out the other side unscathed."

It was here that the writer parted company with "modern" nuclear theory. My flying days began when I ran away from home about 1921 to sneak my first ride in a Jenny. Since then having experienced one air crash, and witnessed many others, no amount of calculations can convince me that which is impossible, *can* be possible. Out of this came a critical examination of all mathematical theory, which led to some theorizing on my own (1).

The state of our theorizing has been well summed up (1953) by a Nobel prize winner, Louis de Broglie, "The history of science shows that the progress of science has constantly been hampered . . . by principles that we have come to assume without discussion." Professor J. C. Bailar, President of the American Chemical Society pointedly reminded scientists (1959) that the theories of today have superseded those of yesterday, and that they in turn will be superseded by those of tomorrow, even if today's seem perfectly logical.

(*The assertions or opinions expressed in this article are those of the author and do not necessarily reflect the views or endorsement of the Navy Department or Naval Service at large.*)

As a starting point it is suggested that one examine several of the references which discuss atmospheric electricity (2, 3, 4). It will be found that the old concept of current flow (+) to (—) is often retained in these writings. Here then is the indication that our present concepts of charge, field, and current flow are in a chaotic state. If our electron and X-ray tubes function by reason of electron passage, then current flow must be electron flow, (—) to (+). And there is a current flow, ionosphere to earth!

Theoretical studies of charge, fields, and gravity led to the prediction that the earth is a (+) charged "particle" spinning in a huge (—) charged electric field (1). But theorizing is one thing and experimentation is still another. So a series of privately financed experiments were begun, utilizing both laboratory apparatus, and small rockets. The procedures and results are outlined below.

Laboratory Experiments

In October, 1957, preliminary experiments were begun with a small Van de Graaff generator producing a maximum electrostatic (+) charge of about seventy-five thousand volts. This unit was used to study the action of various one quarter to one half inch spheres and various powders under the influence of a (+) charged field.

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These preliminary results indicated that a large electrostatic generator would be useful. After several modifications, the final unit constructed was a Van de Graaff generator having a spherical collector head twelve inches in diameter, capable of producing a (+) charge of four hundred twenty-five thousand volts. The capacity of the E. S. generator was increased by employing an electronic high-voltage generator, and applying a (+- potential of twenty-five thousand volts on the groundside brush of the Van de Graaff.

These units were used to study the movement of (+) charged one-to-four-inch-diameter hollow spheres in various (+) and (—) charged electric fields. The spheres were made of glass, plastic, or aluminum. The inner and/or outer surface of the nonconductors were rendered conducting by spraying with lacquer containing aluminum powder. In the case of glass spheres, one of the best sources of supply was ordinary Christmas-tree ornaments which contain inside a flashing of metallic silver. This can be easily removed with a few drops of nitric acid. A nonconducting body does not take a charge and therefor is not repelled.

A sphere placed on the top of the collector of a Van de Graaff generator may take on the same charge, in this case four hundred twenty-five thousand volts (+) with respect to ground. This charging of the small sphere will take place only if one surface is conducting. In the case of nonconductors, if the inner surface only is rendered conducting and is connected in some way with the collector head, then the charge is distributed over the inner conducting surface and the sphere is repulsed. In effect the charge "radiates" as if a point source at the center of the hollow sphere.

Since the charges on the collector and the sphere are both (+), when the electrostatic repulsion of (+) charge for (+) charge is greater than the attraction of gravity for the sphere, then the sphere will move vertically to a point where the electrostatic force equals gravitational force:

$$Fe = k \frac{q1q2}{d^2}$$

Where Fe = electrostatic force
d = distance between charges
$q1$ = charge on collector, a constant under the condition of the experiment
$q2$ = charge on sphere, a variable dependent on various factors
k = a dielectric factor, a constant, but only under a definite set of conditions, i.e., barometric pressure temperature, and humidity

When the sphere rises from the collector, the electrostatic force of repulsion (Fe) is greater than the attraction of gravity (Fg); $Fe > Fg$. As the sphere rises, a point is reached where $Fe = Fg$. The conditions of

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this equilibrium are determined by the following factors (assuming q_1 constant):

(a) Surface-area mass ratio of sphere.

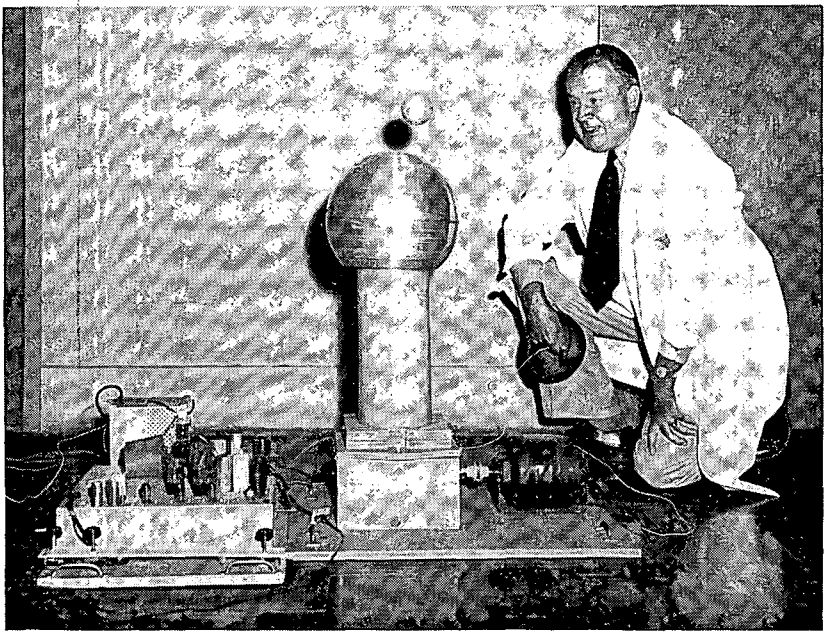
(b) Rate of loss of charge (q_2) of sphere by reason of leakage, a rate influenced by the value of k, which depends on barometric pressure, temperature, humidity, and surface imperfections.

(c) Increase (q_2) by reason of the *acceleration* of the sphere as it begins its rise.

The results of many preliminary series of experiments established the above conditions. In later more extended experiments it was found that mass of material *above* the generator, the electrical conductivity of this material, the time of day and season of the year all influenced the height of rise of the sphere above collector head.

These results show that by careful control of all conditions, it is possible to "titrate" the attraction of the (—) zone above the earth for the

Van de Graaff generator charged to 425,000 (+) repelling a hollow plastic sphere, 4" in diameter. Lower left: Electronic high voltage generator which delivers 25,000 volts (+) to ground side brush of Van de Graaff generator.



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(+) charged sphere as it is repelled by the (+) charged collector head.

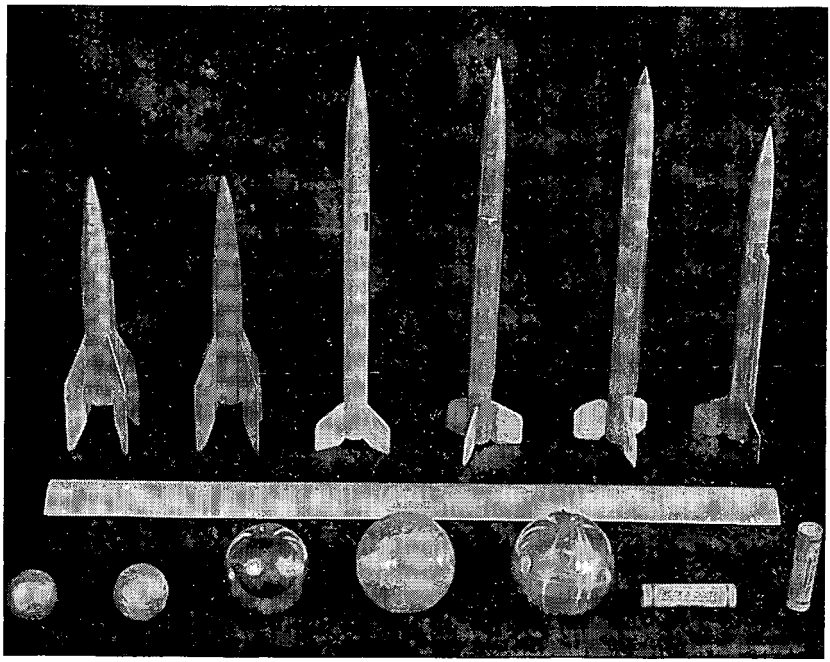
These findings resulted from more than two years of experiments. To those who may wish to check or extend these findings, it is recommended that the experiments be carried on in an isolated lightly constructed building in which temperature and humidity can be rigidly controlled. Only the use of a highspeed movie camera to record height of rise of the spheres will provide refined data and permit accurate plots.

For an explanation of the influence of season of the year and time of day on the (—) charge above the earth see discussion of rocket experiments which follow.

Rocket Experiments

As a result of the laboratory experiments outlined above, it was postulated that a rocket may become a (+) charged body, repelled by the (+) charge on the earth and simultaneously attracted by the (—)

Rockets constructed for test firing under various atmospheric conditions. (Left to right) Plastic, glass, and aluminum spheres used to study factors which influence the repulsion of these bodies by the Van de Graaff generator. Rock-A-Chute motor Type A-4 used in most test firings.



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charged zone above. This reduced to its simplest terms, is a macro reproduction of R. A. Millikan's oil drop experiment, (1909), in which he, at will, augmented or counterbalanced the force of gravity on charged oil droplets, by means of electrostatically charged plates. For this Millikan received the Nobel prize for determining the nature of the unit charge on the electron.

What is given here is the outline of results of two hundred firings of small rockets, and details of a series of do-it-yourself experiments utilizing readily available and safe materials in order that others may repeat the experiments, and it is hoped, confirm and extend the findings.

Rocket Construction

A. Obtain at least three Aerobee-Hi rockets, or others of similar design, which utilize the Rock-A-Chute motor. Assemble in the usual manner, but eliminating the parachute. Install a hard plastic guide tube in place of the paper straw as supplied. (¼" O.D., 3/16" I.D., 4" long, with 45° bevel at each end). Spray all parts and surfaces, inside and out, with a *clear* acrylic lacquer. Repeat spraying three times, allowing suitable drying time between coats. Allow to dry finally over night in a warm room. One of these rockets is now sprayed *only inside* the rocket body with aluminum paint, or lacquer. Another rocket is sprayed so as to cover all surfaces, inside and out, with aluminum paint or lacquer. Beneath outer coating is now an electrically conducting surface. The third rocket is retained as a nonconducting body, completely impregnated with acrylic lacquer.

B. Secure at least three die-cast high dielectric plastic Alpha I rocket bodies, complete with rubber nose tip. Cement the tip to the body. To each, cement a hard plastic guide tube midway between two fins (¼" O.D., 3/16" I.D., 4" long). Pour a bit of aluminum paint or lacquer *inside* the body of one rocket. Rotate, drain and allow to dry. Spray all surfaces of the second Alpha I, inside and out with the aluminum paint, allow to dry thoroughly. Retain the third rocket clean, with no coating.

C. The rocket motors utilized in all these tests are the standard Rock-A-Chute products, type A 4 or type B 6, which are used "as issued" in the Aerobee-Hi models. For the Alpha I, obtain garden hose washers, which are fitted and cemented around the base of the Rock-A-Chute motor, flush with the orifice end of the paper case. This rubber washer serves as a thrust collar and retaining ring. The size of standard hose washers causes the fit of the rocket motor to the Alpha I to be surprisingly snug and shipshape. A bit of tape or paper wrapped around the motor helps to retain the motor in the body.

Firing Conditions

In warm, pleasant weather the amount of moisture, as grams/cubic meter, is about eight times that found

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under cold, dry winter conditions. The optimum conditions for the study of the effect of the earth's electric field on the height of rise of rockets are winter conditions, some distance from any large body of water and low humidity.

Under warm, humid conditions, all rockets become conducting bodies because of adsorption of moisture on the surface of any substance. To check this readily, heat a pyrex beaker in an oven to 125° C. Cool in a dessicator. Rapidly bring to equilibrium on an analytical balance. Watch the progressive increase in weight. This is the water vapor being absorbed on the surface of the glass.

Those fortunate to live in a semi-arid or desert region, have a definite advantage in conducting tests of this kind, since the crux of the whole problem is electrical conductivity of the air and the rocket's surface. High altitudes, dry, cold conditions are those which favor the tests, since these are conditions of lowest conductivity.

Firing Schedule

Fix the Aerobee-Hi rocket launcher rod so that it is *vertical* and is in contact with the ground. In case of dry sand, concrete, or arid conditions, dig a hole near the launching site, drive a metal rod into the ground and electrically connect this ground pin to the launching rod. This insures that the rocket is at ground potential for the full length of the rod. Select an open area at least three hundred yards away from habitation or roadway. Keep bystanders to a minimum. (You will see why later.)

The best time to obtain the greatest potential gradient—as volts/meter—near the surface of the earth is 8:00-11:00 a.m. and 5:00-7:00 p.m. in winter. In summer the most advantageous times are 8:00-9:00 a.m. and 8:00-9:00 p.m. The best season of the year is November through February. Thus the optimum time of firing to reduce to a minimum the leakage of the earth's (+) charge off the rocket is precisely the same time at which the attraction of the (—) field is greatest. Thus to study these phenomena seriously it is necessary to endure some discomfort. Select a clear day, December through January with low temperature and low humidity and fire between 8:00-11:00 a.m. (See references 2 and 4 for details of earth's potential.)

1. Fire the lacquer impregnated nonconducting Aerobee-Hi rocket. Be prepared for erratic behavior, especially if there is a cross wind. Repeat using the untreated plastic Alpha I. Again be wary as the *aerodynamic stability depends in part on conductivity*. These two rockets represent uncharged bodies being propelled only by rocket power.

2. Fire the Aerobee-Hi rocket which has only a conducting inner surface. Note stability of flight, heights of rise, effect of cross wind. Fire the Alpha I which has only its inner surface rendered conducting.

3. Fire the Aerobee-Hi and Alpha

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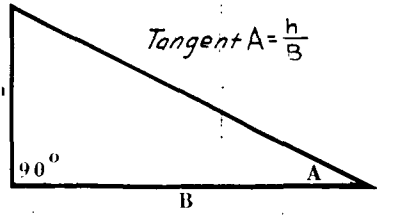
Showing firing technique from jet runway. (Long Island.) Alpha 1 rockets, both nonconducting and conducting types. Note grounding wire and electrical connections for firing.

I rockets which have all surfaces coated with the conducting lacquer. Note height of rise, trajectory and effects of cross wind. Those rockets have intially the same (+) charge as the earth.

In order to get a good approximation of the heights of rise, station two observers at about 300 feet from the launching site, position such that they are at right angles to each other, with respect to the site. One should be facing directly away from the sun, i.e., between sun and site.

Accurately measure each leg of your triangulation grid, and the distance from observer to observer. A very useful sighting quadrant may be prepared by nailing with one nail a lathe, slat or yardstick to a corner of a square board, about 12" x 12" x 1". Using a small protractor, lay off the angles from 0° to 90°, with the 0° at the bottom edge of the sighting board. Always hold this board perpendicular to the ground, and with the 0° line parallel to the ground.

We are now ready to measure the *angle* of rise by sighting along the top edge of the pivoted slat:



If B = 300 feet

And Angle A is	Tangent	Then height (h) is
37°	0.754	226 feet
50°	1.19	357 feet
75°	3.73	1119 feet

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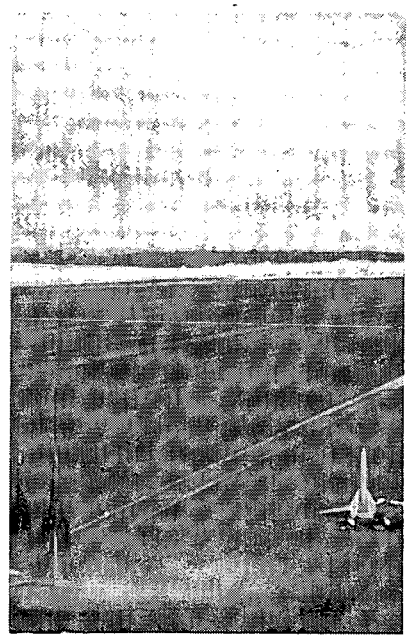

Composite Photo.
1. Nonconducting Alpha 1 rocket at take-off.
2. Conducting Alpha 1 rocket during marked, initial acceleration.
3. Conducting Alpha 1 in flight. Under optimum conditions of time of day, temperature, and humidity, Rockets 2 and 3 will attain altitudes about 400% greater than Rocket 1. Weight of all rockets—54 grams. Rock-A-Chute Motor Model A-4.

If one selects convenient and permanent base lines for the above, and calculating tangent values vs. height, it is easy to prepare a table so as to read off directly the heights at the launching site, rather than wait to work up your results. Just a way that forethought makes the job easier and more fun. The necessary tangent values may be found in any geometry text, most encyclopedias, and scientific handbooks.

Should the rocket veer too far off the vertical path, it is easier to calculate its height when you have two observers. If you estimate the distance from one observer to a point directly under the highest part of the trajectory, then using this value, and the observed angle, calculate the height by the Tangent method outlined above.

From two hundred firings carried out by the author, the following general facts emerge:

a. Both high humidity and high temperatures decrease the rise of a rocket so constructed as to be an accelerating, charged body.

b. Conversely, low temperature and low humidity greatly favor the rise of a rocket so constructed as to retain its charge during acceleration.

c. A completely nonconducting rocket shows erratic flight characteristics in cold, dry weather.

d. An accelerating, conducting rocket becomes a moving charge in an electric field and thus establishes concentric magnetic lines of force. These lines of force couple with the magnetic flux of the earth, stabilizing the flight of the rocket. This effect causes the rocket to resist changes in its vertical path, such as the force of crosswinds might induce.

e. Under optimum conditions the

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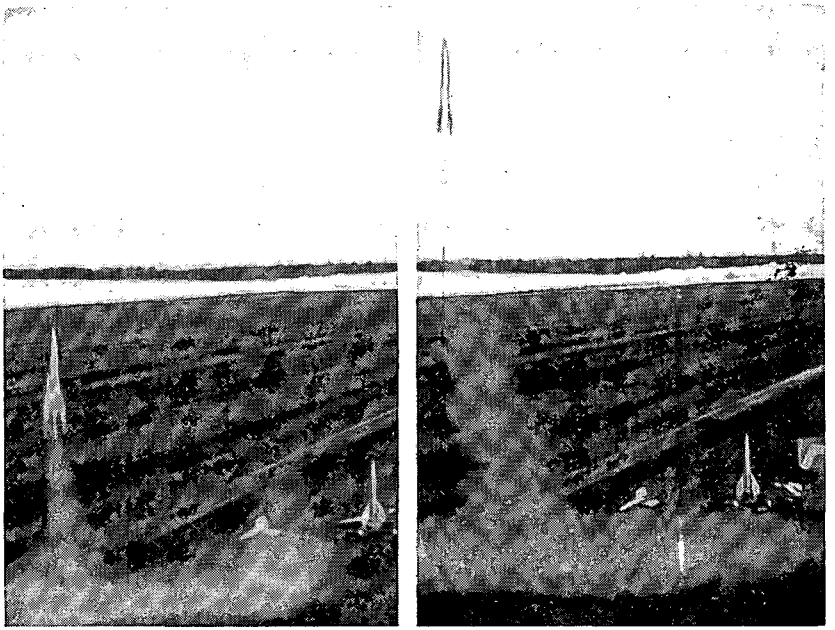

electrostatic field of the earth may be utilized to aid the thrust of a rocket motor.

Conclusion

About 1750, Benjamin Franklin proposed the theory of a single electric "fluid". He rubbed a glass rod with silk and *guessed* that some of the "fluid" was transferred to the glass. Therefore, he called the charge on the glass positive (+). When he rubbed a hard rubber rod with wool, some of the "fluid" seemed rubbed *off* the rubber, and the charge was labeled negative (—). Since the charges were different, the "fluid" flowed from glass positive (+) to rubber negative (—). This is the origin of the direction of the flow of electric current which appeared in practically all textbooks until about 1940.

But with the development of the Bohr concept of the atom, and the clear-cut evidence of the particulate nature of electricity, derived from electronics, the old terminology began to change, showing the flow of current, negative (—) to positive (+). But in this good year of 1960, what is available in our textbooks and reference libraries, indicating the state of our concepts regarding the flow of electric current?

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The following show the flow of current (+) to (—):

Encyclopaedia Americana (1947) Vol. 10., page 102.

Encyclopaedia Britannica Jr. (1949) Vol. 5., page 269

World Book Encyclopedia (1951) Vol. 5., pages 2250-2252.

Scientific American, April 1953, page, 33.

Scientific American, May 1957, page 158.

Medical Radiographic Technique (G. E. X-Ray Tech. Group). Pub., C. C. Thomas, Second Edition (1959) pages 4, 16.

The following show the flow of current (—) to (+):

Encyclopaedia Britannica Jr. (1949) Vol 5., pages 272-278.

Encyclopaedia Britannica (1947) Vol. 8., pages 231, 340.

World Book Encyclopedia (1951) Vol 5., pages 2248, 2251.

Medical Radiographic Technique, Second Edition (1959), pages 3, 17, 37.

And so we may find whatever may suit our fancy. In fact, many widely used physics texts, while explaining current flow as electron flow, (—) to (+), still retain the diagrams of earlier editions showing the flow, (+) to (—).

Science is in one of those transition periods where *new knowledge* conflicts with *old terminology* and there is just now a woeful lack of critical evaluation of what one scientist means by his writings and diagrams. Older references are cited and their conclusions accepted, thus there is a continuous recycling of erroneous concepts which can not stand up in the light of new data. In short, we have come so far, so fast, that our further progress is being hampered by outmoded concepts retained, referenced and still taught as valid. Faulty communications lose battles!

In the Spring of 1958, as the result of the laboratory studies with various charged spheres, a prediction —call it an educated guess—was hazarded. "The Russians are firing their rockets from a high, dry, cold place." Subsequently published reports show their major launching site to be northeast of the Caspean Sea (45° N) on a *desert* plateau, altitude five hundred feet. They fire their high thrust rockets largely during cold weather, after October 1st. These are the conditions which the rocket firings reported herein show to be optimum for taking advantage of the earth's electric field. The atmospheric conditions which exist at Cape Canaveral and Point Mugu are those which completely negate this effect.

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1. "New Principles in Quantum Mechanics," H. C. Dudley, Exposition Press, Inc., New York City, December 1959.
2. "Electricity Atmospheric." *Encyclopeadia Britannica,* Vol 8, 1947.
3. *Scientific American.* April 1953, p. 32, May 1957, p. 158.
4. "Atmospheric Electricity," J. A. Chalmers. Pergamon Press, 1957.

THE END

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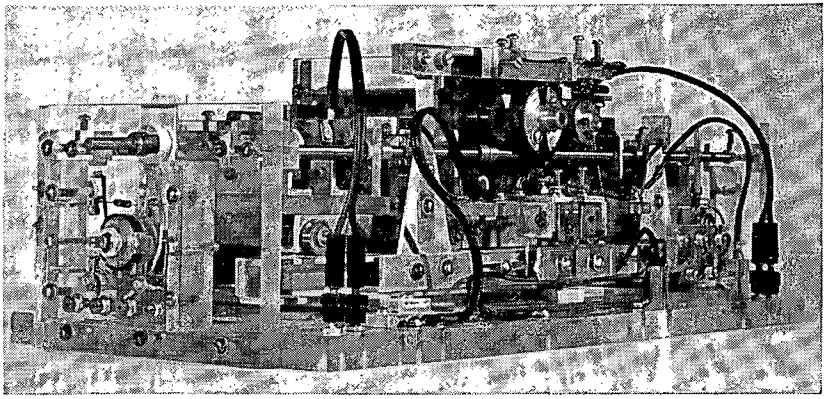
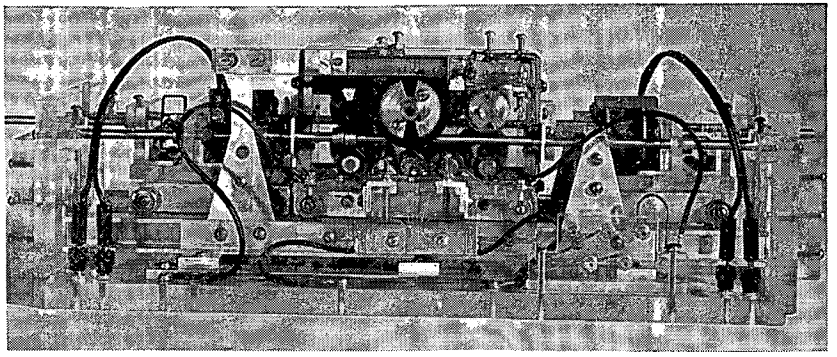
INSTRUMENTATION



for the DEAN DEVICE



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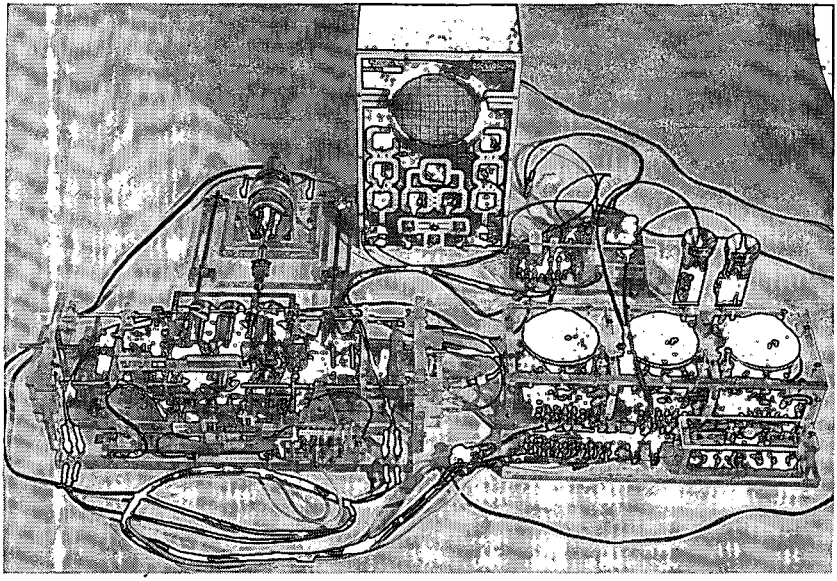

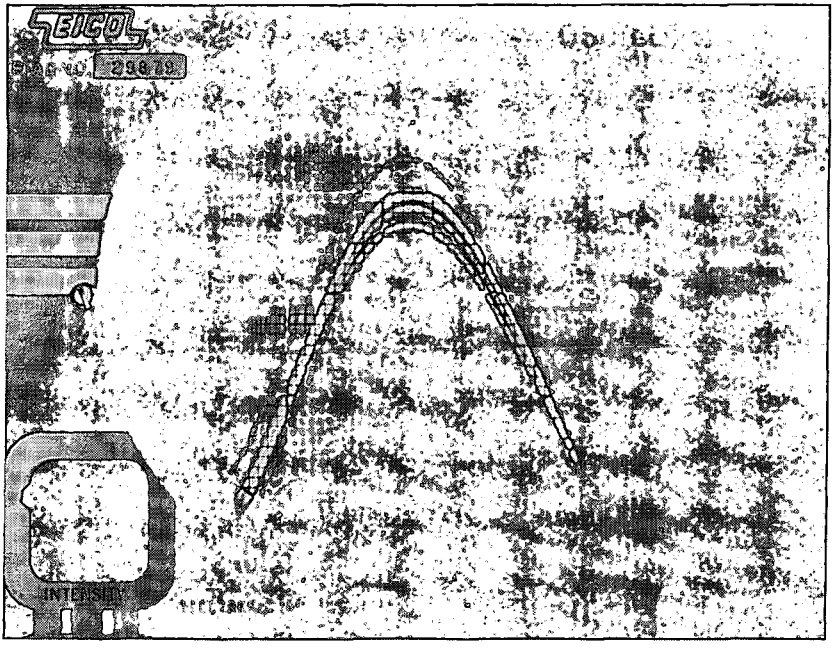

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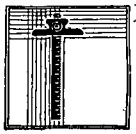

HE photographs on the preceding pages show some of Norman Dean's original instrumentation for his research on the Dean drive system.

It is freely agreed by all concerned that bathroom scales are an inadequate form of instrumentation; it was never considered that they were proper scientific devices. The instrument setup shown is what Dean himself built and used in his research; a number of strain-gauge systems are incorporated into its structure, and associated strain-gauge amplifiers were used to produce the oscillogram shown.

For the information of those who "explained away" Dean's results in terms of the nonlinear response of bathroom scales—the explanation doesn't hold. Strain gauges show the effect. But strain gauge readings are meaningful only when you have, yourself, studied the precise method of installation, and have, yourself, calibrated them *in situ.*

What Dean was seeking, and never succeeded in getting any government bureau to do, was to give his device a test on *their strain-gauge setups.* The sole point of the bathroom scale was to give a rough indication that there was something there worth taking the trouble to test for properly. The glitter of yellowish particles with metallic luster in a piece of quartz rock doesn't prove you've found a gold mine—but it does suggest it would be worth your while to make a proper test.

None of the government agencies, up to the time of the issuance of the patent, had even bothered to study Dean's own strain-gauge records.

The quality of workmanship in Dean's instrumentation suggests that his work of measurement is not sloppy or ill-considered.

This instrument setup was designed and built solely as a test instrument, to explore the essential principle of the Dean System.

There have been complaints that I did not adequately discuss the Dean device, but talked only about its rejection. There's a reason—a good one. The Dean gadget is, mechanically, a very simple contraption. But the theoretical structure underlying it is decidedly not simple; I was fully aware that it was completely impossible to discuss the thing at all adequately in anything less than a full-scale thesis, and therefore skipped the thing entirely.

Put it this way; if I had stated, in 1935, that nuclear energy could be released very simply by just dissolving some uranium sulfate or nitrate in water, you can imagine the reception that statement would have gotten. *Yet that statement is precisely and literally correct!* That's a literal description of the Los Alamos Water Boiler reactor. It's true that you need U-235-enriched uranium sulfate, and/or heavy water . . . but the statement is an exactly correct description of the simple way in which nuclear energy can be released.

I could, also, have stated, "You

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need only pile up some blocks of graphite and lumps of ordinary uranium metal, or uranium oxide, and you will release atomic power." That, too, is an exact and literal description of a true nuclear reactor—the famous original Stagg Field reactor.

Each of those devices was mechanically an extremely simple thing . . . but there was a tremendous background of highly sophisticated research and design underlying them.

When I first heard of the atomic pile, my reaction was, "Why . . . someone might have stumbled on that thing accidentally!"

No, no one would stumble on it accidentally. It's true that naturally-occurring uranium can be used in the Fermi type moderated reactor . . . but only very, very specially hyper-purified uranium, and the graphite must be a very, very special hyper-purified graphite. It'd never happen that way by accident. Vanadium is one of the worst neutron-absorbing impurities . . . and vanadium is normally heavily laced into uranium ores. Most of the pre-WWII production of uranium in this country was a by-product of mining vanadium ores. In addition, graphite is commonly produced from petroleum residues . . . and vanadium is a common contaminant.

Again, a transistor is an extremely simple device. It consists simply of a tiny wafer sliced from a lightly impure germanium or silicon crystal, with three wires soldered to it.

Now let's see you go home and make one!

"Why, if it could be done as simply as *that,* someone would have done it years ago!"

Oh . . . yeah?

It is absolutely true that all you need to do to release atomic power is to dissolve a few pounds of uranium nitrate in water.

Dean's device is only *mechanically* simple.

Since my last report on progress of study of Dean's gadget, one of the very large corporations that tackled the thing has made a complete theoretical-mathematical analysis of the concepts. They find that Dean's mathematical structure is perfectly valid; their math-physics department agrees, after giving it a full run-through on a large electronic computer, that he definitely can get force and energy output as he states. The one problem they can't nail down is how to show that he can feed force and energy into it; that problem arises because they have no satisfactory criteria for determining what frame of reference should be used in discussing the problem.

I've seen a short—and admittedly rough—mathematical analysis of the problem done by an engineer friend that, in essence, comes up with this answer: The centrifugal force generated in one sector of the rotation in an upward direction comes out exactly equal and opposite to the force exerted, in the rest of the cycle, in the downward direction. This, in other words, complies in full with Newton's equal-and-opposite law. If you break off the analysis at that point,

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you have a mathematical proof that Dean's device does *not* produce a drive.

The fault in the "proof" is that while the two forces are equal and opposite, *they do not have equal duration.* The *forces* are equal and opposite . . . *but the impulses are not.* If that inequality is as small as one per cent, then if you generate a centrifugal force of 1000g—which is easy to do!—you have a 10g net.

Of the oscillogram, Norman Dean says: "Please disregard the top light line caused by exterior interference. The top heavy line is zero force exerted by the oscillator in its free condition in each cycle. The next line down represents the cyclical re-setting force or reaction. The distance from the zero line to the bottom line is the amount of positive thrust exerted in each cycle. The two lower lines are of exactly the same time duration in each cycle, in this case 55° of rotation. We therefore find that the net thrust in each cycle was the difference between the two lower lines. The picture is a time exposure of about ten cycles."

THE END

THE ANALYTICAL LABORATORY

August 1960

PLACE	STORY	AUTHOR	POINTS
1.	The High Crusade (Pt. 2)	Poul Anderson	2.00
2.	Adaptation	Mack Reynolds	2.24
3.	A Taste of Poison	Christopher Anvil	3.26
4.	Pushbutton War	Joseph P. Martino	3.34
5.	Report on the Nature of the Lunar Surface	John Brunner	4.06

September 1960

1.	The High Crusade (Conclusion)	Poul Anderson	2.00
2.	By Proxy	David Gordon	2.56
3.	Alarm Clock	Everett B. Cole	3.43
4.(Tie)	Barnacle Bull	Winston P. Sanders	3.50
	A Transmutation of Muddles	H. B. Fyfe	3.50

THE EDITOR.

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SUN SPOT.

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That really close-up observations of the Sun would be useful is certain—but getting really close to the Sun is something else. A man wouldn't have the chance of a snowball in Hell . . . or perhaps, that's just the chance he needs . . .

By HAL CLEMENT

Illustrated by Schoenherr

RON Sacco's hand reached gently toward his switch, and paused. He glanced over at the commander, saw the latter's eyes on him, and took a quick look at the clock. Welland turned his own face away—to hide a smile?—and Sacco almost angrily thumbed the switch.

Only one of the watchers could follow the consequences in real detail. To most, the closing of the circuit was marked a split second later by a meaningless pattern on an oscilloscope screen; to "Grumpy" Ries, who had built and installed the instrument, a great deal more occurred between the two events. His mind's eye could see the snapping of relays, the pulsing of electrical energy into the transducers in the ice outside and the hurrying sound waves radiating out through the frozen material; he could visualize their trip, and the equally hasty return as they echoed back from the vacuum that bounded the flying iceberg. He could follow them step by step back through the electronic gear, and interpret the oscilloscope picture almost as well as Sacco. He saw it, and turned away. The others kept their eyes on the physicist.

Sacco said nothing for a moment. He had moved several manual pointers to the limits of the weird shadow on the screen, and was using his slide rule on the resulting numbers. Several seconds passed before he nodded and put the instrument back in its case.

"Well?" sounded several voices at once.

"We're not boiling off uniformly. The maximum loss is at the south pole, as you'd expect; it's about sixty centimeters since the last reading. It decreases almost uniformly to zero at about fifteen degrees north; any loss north of that has been too small

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for this gear to measure. You'll have to go out and use one of Grumpy's stakes if you want a reading there."

No one answered this directly; the dozen scientists drifting in the air of the instrument room had already started arguments with each other. Most of them bristled with the phrase "I told you—" The commander was listening intently now; it was this sort of thing which had led him, days before, to schedule the radius measurements only once in twelve hours. He had been tempted to stop them altogether, but realized that it would be both impolite and impractical. Men riding a snowball into a blast furnace may not be any better off for knowing how fast the snowball is melting, but being men they *have to know.*

Sacco turned from his panel and called across the room.

"What are the odds now?"

"Just what they were before," snapped Ries. "How could they have changed? We've buried ourselves, changed the orbit of this overgrown ice cake until the astronomers were happy, and then spent our time shoveling snow until the exhaust tunnels were full so that we couldn't change course again if we wanted to. Our chances have been nailed down ever since the last second the motors operated, and you know it as well as I do."

"I stand . . . pardon me, float . . . corrected. May I ask what our *knowledge* of the odds is now?" Ries grimaced, and jerked his head toward the commander.

"Probably classified information. You'd better ask the chief executive of Earth's first manned comet how long he expects his command to last."

Welland managed to maintain his unperturbed expression, though this was as close to outright insolence as Ries had come yet. The instrument man was a malcontent by nature, at least as far as speech went; Welland, who was something of a psychologist, was fairly sure that the matter went no deeper. He was rather glad of Ries' presence, which served to bring into the open a lot of worrying which might otherwise have simmered under cover, but that didn't mean that he liked the fellow; few people did. "Grumpy" Ries had earned his nickname well. Welland, on the present occasion, didn't wait for Sacco to repeat the question; he answered it as though Ries had asked him directly—and politely.

"We'll make it," he said calmly. "We knew that long ago, and none of the measures have changed the fact. This comet is over two miles in diameter, and even after our using a good deal of it for reaction mass it still contains over thirty billion tons of ice. I may be no physicist, but I can integrate, and I know how much radiant heat this iceberg is going to intercept in the next week. It's not enough, by a good big factor, to boil off any thirty billion tons of the stuff around us. You all know that—you've been wasting time making a book on how much we'd still have around us after perihelion, and not one of you has

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figured that we lose more than three or four hundred meters from the outside. If that's not a safe margin, I don't know what is."

"You don't know, and neither do I," retorted Ries. "We're supposed to pass something like a hundred thousand miles from the photosphere. You know as well as I do that the only comet ever to do that came away from the sun as two comets. Nobody ever claimed that it *boiled* away."

"You knew that when you signed up. No one blackmailed you. No one would—at least, no one who's here now." The commander regretted that remark the instant he had made it, but saw no way to retract it. He was afraid for a moment that Ries might make a retort which he couldn't possibly ignore, and was relieved when the instrument man reached for a handhold and propelled himself out of the room. A moment later he forgot the whole incident as a physicist at one of the panels suddenly called out.

"On your toes, all of you! X-ray count is going up—maybe a flare. Anyone who cares, get his gear grinding!" For a moment there was a scene of confusion. Some of the men were drifting free, out of reach of handholds; it took these some seconds to get swimming. Others, more skilled in weightless maneuvering, had kicked off from the nearest wall in the direction of whatever piece of recording machinery they most cherished, but not all of these had made due allowance for the traffic. By the time everyone was strapped in his proper place, Ries was back in the room, his face as expressionless as though nothing had been said a few moments before. His eyes kept swiveling from one station to another; if anyone had been looking at him, they would have supposed he was just waiting for something to break down. He was.

To his surprise, nothing did. The flare ran its course, with instruments humming and clicking serenely and no word of complaint from their attendants. Ries seemed almost disappointed; at least Pawlak, the power plant engineer who was about the only man on board who really liked the instrument specialist, suspected that he was.

"C'mon, Grump," was this individual's remark when everything seemed to have settled down once more. "Let's go outside and bring in the magazine from the monitor camera. Maybe something will have gone wrong with *it*; you said you didn't trust that remote-control system."

Ries almost brightened.

"All right. These astronomers will probably be howling for pictures in five minutes anyway, so they can tell each other they predicted everything correctly. Suit up." They left the room together with no one but the commander noting their departure.

There was little space outside the ship's air lock. The rocket had been brought as close to the center of the comet as measurement would permit, through a tunnel just barely big enough for the purpose. Five more

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smaller tunnels had been drilled, along three mutually perpendicular axes, to let out the exhaust of the fusion-powered reaction motors which were to use the comet's own mass to change its course. One other passageway, deliberately and carefully zigzagged, had been cut for personnel. Once the sunward course had been established all the tunnels except the last had been filled with "snow"—crushed comet material from near the ship. The cavern left by the removal of this and the exhaust mass was the only open space near the vessel, and even that was not too near. No one had dared weaken the structure of the big iceberg *too* close to the rocket; after all, one comet *had* been seen to divide as it passed the sun.

The monitor camera was some distance from the mouth of the tunnel —necessarily; the passage had been located very carefully. It opened in the "northern" hemisphere, as determined by direction of rotation, so that the camera could be placed at its mouth during perihelion passage and get continuous coverage. This meant, however, that in the comet's present orbital position the sun did not rise at all at the tunnel mouth. Since pictures had to be taken anyway, the camera was at the moment in the southern hemisphere, about a mile from the tunnel mouth.

Some care was needed in reaching it. A space-suited man with a mass of two hundred fifty pounds weighed something like a quarter of an ounce at the comet's surface, and could step away at several times the local escape velocity if he wished—or, for that matter, if he merely forgot himself. A dropped tool, given only the slightest accidental shove sideways, could easily go into orbit about the comet—or leave it permanently. That problem had been solved, though, after a fashion. Ries and Pawlak attached their suits together with a snap-ended coiled length of cable; then they picked up the end of something resembling a length of fine-linked chain which extended off to the southwest and disappeared quickly over the near horizon—or was it around the corner? Was the comet's surface below them, or beside or above? There was not enough weight to give a man the comforting sensation of a definite "up" and "down." The chain had a loop at the end, and both men put one arm through this. Then Ries waved his free arm three times as a signal, and they jumped straight up together on the third wave.

It was not such a ridiculous maneuver if one remembered the chain. This remained tight as the men rose, and pulled them gradually into an arc toward the southwest.

Partway up, they emerged from the comet's shadow, the metal suits glowing like miniature suns themselves. The great, gaseous envelope of a comet looks impressive from outside, seen against a background of black space; but it means exactly nothing as protection from sunlight even at Earth's distance from the sun. At twenty million miles it is much less, if such a thing is possible. The

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suits were excellent reflectors, but as a necessary consequence they were very poor radiators. Their temperature climbed more slowly than that of the proverbial black body, but it would climb much higher if given time. There would be perhaps thirty minutes before the suits would be too hot for life; and that, of course, was the reason for the leap.

A one-mile walk on the surface of the comet would take far more than half an hour if one intended to stay below circular velocity; swinging to their goal as the bobs on an inverted pendulum, speed limited only by the strength of their legs, should take between ten and twelve minutes. There were rockets on their suits which could have cut even that time down by quite a factor, but neither man thought of using them. They were for *emergency;* if the line holding them to the comet were to part, for example, the motors would come in handy. Not until.

They reached the peak of their arc, the chain pointing straight "down" toward the comet. Their goal had been visible for several minutes, and they had been trying to judge how close to it they would land. A direct hit was nearly impossible; even if they had been good enough to jump exactly straight up, the problem was complicated by the comet's rotation. As it turned out, the error was about two hundred yards, fairly small as such things went.

The landing maneuver was complicated-looking but logical. Half a minute before touchdown, Ries braced his feet against Pawlak and pushed. The engineer kept his grip on the chain and stayed in "orbit" while his companion left him in an apparently straight line. About fifteen seconds sufficed to separate them by the full length of the connecting snap line; the elasticity of this promptly started them back together, though at a much lower speed than they had moved apart. Just before they touched the surface, Ries noted which side of the camera the snap line was about to land on, and deliberately whipped it so that it fell on the other side; then, when both men took up slack, it snubbed against the camera mounting. Even though both men bounced on landing—it was nearly impossible to take up exactly the right amount of energy by muscle control alone—they were secure. Ries sent a couple of more loops rippling down the line and around the camera mount—a trick which had taken some practice to perfect, where there was no gravity to help—and the two men pulled themselves over to their goal. The tendency to whip around it like a mishandled yo-yo as they drew closer was a nuisance but not a catastrophe; both were perfectly familiar with the conservation of angular momentum.

Ries quickly opened the camera, removed the exposed part of the film in its take-up cartridge and replaced and re-threaded another, checked the mounting for several seconds, and the job was done. The trip back was like that out, except for the complication that their landing spot was not in

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sunlight and control was harder. Five minutes after getting their rope around the pole at the tunnel mouth, they were in the ship. There was no speed limit *inside* the comet.

Once they were inside the air lock, Ries' prophecy was promtply fulfilled. Someone called for pictures before his suit had been off for two minutes. Pawlak watched his friend's blood pressure start up, and after a moment's calculation decided that intervention was in order—Grumpy couldn't be allowed *too* many fights.

"Go develop the stuff," he said. "I'll calm this idiot down."

For a moment it looked as though Ries would rather do his own arguing; then he relaxed, and vanished toward the instrument shop. Pawlak homed on the voice of the complaining astrophysicist, and in the three minutes it took Ries to process the film managed to make the fellow feel properly apologetic. This state of affairs lasted for about ten seconds after the film was delivered.

A group of six or seven scientists were waiting eagerly and had it in a projector almost instantly. For a few seconds after the run started there was silence; then a babble of expostulating voices arose. The general theme seemed to be, "Where's that instrument maker?"

Ries had not gone far, and when he appeared did not seem surprised. He didn't wait to be asked any questions, but took advantage of the instant silence which greeted his entrance.

"Didn't get your flare, did you? I didn't think so. That camera has a half-degree field, and the sun is over two degrees wide seen from here—"

"We know that!" Sacco and two or three others spoke almost together. "But the camera was supposed to scan the whole sun automatically whenever it was turned on from here, and keep doing it until we turned it off!"

"I know. And it didn't scan. I thought it hadn't when I was getting the film—"

"How could you tell? Why didn't you fix it? Or did you? What was wrong, anyway? Why didn't you set it up right in the first place?"

"I could tell that there hadn't been enough film exposed for the time it was supposed to be on. As for fixing it out there, or even finding out what was wrong—don't sound any more idiotic than you can help. It'll have to be brought into the shop. I can't promise how long it'll take to fix it until I know what's wrong."

The expostulation rose almost to a roar at this last remark. The commander, who alone of the group had been silent until now, made a gesture which stilled the others.

"I know it's hard to promise, but please remember one thing," he said. "We're twenty million miles from the sun; we'll be at perihelion in sixty-seven hours. If we pass it without that camera, we'll be missing our principal means of correlating any new observations with the old ones. I don't say that without the camera we might as well not be here, but—"

"I know it," growled Ries. "All

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right. I knew we should have laid down a walk cable between here and the blasted thing when we first set it up, but with people talking about time and shortage of anchoring pins and all that tripe—"

"I think that last was one of your own points," interjected the commander. "However, we have better things to do than fix blame. Tell us what help you need in getting the camera back to the ship."

An hour later, the device came in through the air lock. Its mass had demanded a slight modification in travel technique; if the chain had broken during a "swing" the rockets would not have been able to return men and camera both to the comet, in all likelihood. Instead of swinging, therefore, the workers had pulled straight along the chain, building up speed until they reached its anchorage and then slowing down on the other side by applying friction to the chain as it unwound behind them. An extra man with a line at the tunnel mouth had simplified the stopping problem on the return trip with the camera.

Four hours later still, Ries had taken the camera completely apart and put it together again, and was in a position to say that there had been nothing wrong with it. He was not happy about this discovery, and the scientists who heard his report were less so. They were rather abusive about it; and that, of course detonated the instrument man's temper.

"All right, *you* tell *me* what's wrong!" he snapped at last. "I can say flatly that nothing is broken or out of adjustment, and it works perfectly in here. Any genius who's about to tell me that *in here* isn't *out there* can save his breath. I know it, and I know that the next thing to do is take it back out and see if it still works. That's what I'm doing, if I can spare the time from listening to your helpful comments." He departed abruptly, donned his suit, and went outside with the instrument but without Pawlak. He had no intention of returning to the original camera site, and needed no help. The tunnel mouth was "outside" enough, he felt.

It took several more hours to prove that he was right. At first, the trouble refused to show itself. The camera tracked beautifully over any sized square of sky that Ries chose to set into its control. Then after half an hour or more, the size of the square began to grow smaller no matter what he did with the controls. Eventually it reached zero. This led him into its interior, as well as he could penetrate it in a spacesuit, but no information was forthcoming. Then, just to be tantalizing, the thing started to work again. On its own, as far as Ries could tell. He was some time longer in figuring out why.

Eventually he came storming back into the ship, fulminating against anyone who had had anything to do either with designing or selecting the device. He was a little happier, since the trouble was demonstrably not his own fault, but not much. He made this very clear to the waiting group as soon as his helmet was off.

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"I don't know what genius indulged his yen for subminiaturization," he began, "but he carried too far. I suppose using a balanced resistance circuit in a control is sensible enough; it'll work at regular temperatures, and it'll work at comet temperatures. The trouble is it won't work unless the different segments are near the *same* temperature; otherwise the resistors can't possibly balance. When I first took the thing outside, it worked fine; it was at ship's temperature. Then it began to leak heat into the comet, and went crazy. Later on, with the whole thing cooled down to comet temperature, it worked again. Nice design!"

"But it had been outside for days before—" began someone, and stopped as he realized what had happened. Ries pounced on him just the same.

"Sure—outside *in the sunlight.* Picking up radiant heat on one side, doing its best to get to equilibrium at a couple of hundred degrees. Conducting heat out into the ice four or five hundred degrees colder on the other side. Nice, uniform—aach!"

"Can't a substitute control be devised?" cut in the commander mildly. "That's your field, after all. Surely you can put something together—"

"Oh, sure. In a minute. We're just loaded with spare parts and gear; rockets always are. While I'm at it I'll try to make the thing wristwatch size so it will fit in the available space—all we need is a research lab's machine shop. I'll do what I can, but you won't like it. Neither

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will I." He stormed out to his own shop.

"I'll buy his last remark, anyway," muttered someone. Agreement was general but not too loud.

At fifteen million miles from the sun, with another meter or so boiled off the comet's sunlit surface, Ries emerged with his makeshift. He was plainly in need of sleep, and in even worse temper than usual. He had only one question to ask before getting into his suit.

"Shouldn't the sun be starting to show near the tunnel mouth by now?"

One of the astronomers did a little mental arithmetic.

"Yes," he answered. "You won't need to travel anywhere to test the thing. Do you need any help?"

"What for?" growled Ries in his usual pleasant fashion, and disappeared again. The astronomer shrugged. By the time conversation had gotten back to normal the instrument specialist and his camera were in the air lock.

Taking the heavy device out through the tunnel offered only one danger, and that only in the last section—the usual one of going too fast and leaving the comet permanently. To forestall the risk of forcing people to pay final respects to him and regret the camera, he made full use of the loops of safety cable which had been anchored in the tunnel wall. He propped the instrument at the tunnel mouth facing roughly north, and waited for sunrise. This came soon enough. It was the display characteristic of an airless world, since the coma was not dense enough to scatter any light to speak of. The zodiacal light brightened near the horizon; then it merged into pearly corona; then a brilliant crimson eruptive arch prominence appeared, which seemed worth a picture or two to the nonprofessional; and finally came the glaring photosphere on which the test had to be made. It was here that another minor problem developed.

The photosphere, area for angular area, was of course no brighter than when seen from just above Earth's atmosphere; but it was no fainter either, and Ries could not look at it to aim his camera. The only finder on the latter was a direct-view collimating sight, since it was designed for automatic control. After a moment's thought, Ries decided that he could handle this situation too, but, since his solution would probably take longer than the sun would be above the horizon, he simply ran the camera through a few scanning cycles, aiming it by the shape of its own shadow. Then he anchored the machine in the tunnel mouth and made his way back to the ship.

Here he found what he wanted with little difficulty—a three-inch-square interference filter. It was not of the tunable sort, though of course its transmission depended on the angle of incidence of the light striking it, but it was designed for sixty-five hundred Angstroms and would do perfectly well for what he had in mind.

Before he could use it, though, an-

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other problem had to be solved. Almost certainly the lining up of the camera and its new control—that is, making sure that the center of its sweep field agreed with the line laid down by the collimator sight—would take quite a while. At fifteen million miles from the sun, one simply doesn't work for long with only a space-suit as protection. The expedition had, of course, been carefully planned so that no one would have to do any such thing; but the plans had just graduated from history to mythology. Grumpy Ries was either going to work undisturbed in full sunlight, probably for one or two whole hours, or spend twenty minutes cooling off in the tunnel for every ten he spent warming up outside it; and that last would add hours and hours to the job time—with the heating period growing shorter with each hour that passed. A parabolic orbit has one very marked feature; its downhill half is very *steepiy* downhill, and speed builds up far too quickly for comfort. It seemed that some means of working outside, if one could be found, would pay for itself. Ries thought he could find one.

He was an artisan rather than a scientist, but he was a good artisan. A painter knows pigments and surfaces, a sculptor knows metal and stone; Ries knew basic physics. He used his knowledge.

Limited as the spare supplies were, they included a number of large rolls of aluminum foil and many spools of wire. He put these to use, and in an hour was ready with a six-foot-square shield of foil, made in two layers a couple of inches apart, the space between them stuffed with pulverized ice from the cavern. In its center was mounted the filter, and beside this a hole big enough to take the camera barrel. The distance between the two openings had been measured carefully; the filter would be in front of the camera sight.

Characteristically, he showed the device to no one. He made most of it outside the ship, as a matter of fact; and when it was done he towed it rather awkwardly up the tunnel to the place where the camera was stored. Incredibly, twenty minutes later the new control was aligned, the camera mounted firmly on its planned second base at the tunnel mouth, and a control line was being run down the tunnel to the ship. With his usual curtness he reported completion of the job; when the control system had been tested from inside, and the method Ries had used to accomplish the task wormed out of him, the reaction of the scientists almost had him smiling.

Almost; but a hardened grouch doesn't change all at once—if ever.

Ten million miles from Sol's center. Twenty-one hours to go—people were not yet counting minutes. The sun was climbing a little higher above the northern horizon as seen from the tunnel mouth, and remaining correspondingly longer in view each time it rose. Some really good pictures were being obtained; nothing yet which couldn't have been taken from one of the orbital stations near Earth.

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Five million miles. Ten hours and fifty minutes. Ries stayed inside, now, and tried to sleep. No one else had time to. Going outside, even to the mouth of the tunnel, was presumed impossible, though the instrument maker had made several more shields. Technically, they were within the corona of the sun, though only of its most tenuous outlying zones—there is, of course, a school of thought that considers the corona as extending well past the earth's orbit. None of the physicists were wasting time trying to decide what was essentially a matter of definition; they were simply reading and recording every instrument whose field of sensitivity seemed to have the slightest bearing on their current environment, and a good many which seemed unlikely to be useful, but who could tell?

Ries was awake again when they reached the ninety degree point—one quarter of the way around the sun from perihelion. The angular distance the earth travels in three months. Slightly over one million miles from the sun's center. Six hundred thousand miles from the photosphere. Well within *anyone's* definition of the corona; within reach of a really healthy eruptive prominence, had any been in the way. One hour and eighteen minutes from their closest approach—or deepest penetration, if one preferred to put it that way. Few did.

They were hurtling, at some three hundred ten miles per second, into a region where the spectroscope claimed temperatures above two million degrees to exist, where ions of iron and nickel and calcium wandered about with a dozen and more of their electrons stripped away, and where the electrons themselves formed almost a gas in their own right, albeit a highly tenuous one.

It was that lack of density on which the men were counting. A single ion at a "temperature" of two million degrees means nothing; there isn't a human being alive who hasn't been struck by vast numbers of far more energetic particles. No one expected to pick up any serious amount of heat from the corona itself.

The photosphere was another matter. It was an opaque, if still gaseous, "surface" which they would approach within one hundred fifty thousand miles—less than its own diameter by a healthy factor. It had a radiation equilibrium temperature of some six thousand degrees, and would fill a large solid angle of sky; this meant that black-body equilibrium temperature at their location would not be much below the same value. The comet, of course, was not a black body—and did not retain even the heat which it failed to reflect. The moment a portion of its surface was warmed seriously, that portion evaporated, taking the newly acquired heat energy with it. A new layer, still only a few degrees above absolute zero, was exposed in its turn to the flood of radiation.

That flood was inconceivably intense, of course; careless, non-quantitative thought could picture the comet's vanishing under that bom-

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bardment like a snowball in a blast furnace—but the flood wasn't infinite. A definite, measurable amount of energy struck the giant snowball; a definite amount was reflected; a definite, measurable amount was absorbed and warmed up and boiled away the ices of water and ammonia and methane that made it up.

And there was a lot to boil away. Thrust-acceleration ratios had long ago given the scientists the mass of their shelter, and even at a hundred and fifty thousand miles a two and a half mile thick bar of sunlight will take some time to evaporate thirty-five billion tons of ice. The comet would spend only a little over twenty-one hours within five million miles of the sun, and unless several physicists had misplaced the same decimal point, it should last with plenty to spare. The twelve-hour rule on Sacco's echo sounder had been canceled now, and its readings were common knowledge; but none of them caused anxiety.

In they drove. No one could see out, of course; there was nothing like the awed watching of an approaching prominence or gazing into the deceptively pitlike area of a sunspot of which many of them had unthinkingly dreamed. If they could have seen a sunspot at all, it would have been as blinding as the rest of the photosphere—human eyes couldn't discriminate between the two orders of overload. For all any of them knew, they might be going through a prominence at any given second; they wouldn't be able to tell until the instrument records were developed and reduced. The only people who could "see" in any sense at all were the ones whose instruments gave visible as well as recorded readings. Photometers and radiometers did convey a picture to those who understood them; magnetometers and ionization gauges and particle counters meant almost as much; but spectrographs and interferometers and cameras hummed and clicked and whirred without giving any clues to the nature of the meals they were digesting. The accelerometers claimed their share of watchful eyes—if there were any noticeable drag to the medium outside all bets on the comet's future and their own were off—but nothing had shown so far.

They were nineteen minutes from perihelion when a growing sense of complacency was rudely shattered. There was no warning—one could hardly be expected at three hundred twenty-five miles a second.

One instant they were floating at their instruments, doing their allotted work, at peace with the universe; the next there was a violent jolt, sparks flew from exposed metal terminals, and every remote indicator in the vessel went dead.

For a moment there was silence; the phenomenon ended as abruptly as it had started. Then there was a mixed chorus of yells, mostly of surprise and dismay, a few of pain. Some of the men had been burned by spark discharges. One had also been knocked out by an electric shock, and it was fortunate that the emergency

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lights had not been effected; they sprang automatically to life as the main ones failed, and order was quickly restored. One of the engineers applied mouth-to-mouth respiration to the shock victim—aesthetic or not, it is the only sort practical in the weightless condition—and each of the scientists began trouble shooting.

None of the remote gear registered in any way, but much of the apparatus inside the ship was still functioning, and a tentative explanation was quickly reached.

"Magnetic field," was Mallion's terse comment, "size impossible to tell, just as impossible to tell what formed or maintained it. We went through it at three hundred twenty miles a second, plus. If this ship had been metal, it would probably have exploded; as it was, this general sort of thing was a considered possibility and there are no long conducting paths anywhere in the ship—except the instrument controls. The field intensity was between ten and a hundred Gauss. We've taken all the outside readings we're going to, I'm afraid."

"But we can't stop now!" howled Donegan. "We need pictures—hundreds more of them. How do we correlate all the stuff we have, and the things that will still show on the inside instruments we can still use, unless there are pictures—it's fine to say that this or that or the other thing comes from a prominence, or a flare, or what have you, but we won't *know* it does, or anything about the size of the flare. . . ."

"I understand, sympathize, and agree; but what do you propose to do about it? I'd bet a small but significant sum that the cable coming in through the access tunnel *did* explode. Something certainly stopped the current surge before all the instruments here burned up."

"Come on, Dr. Donegan. Get your suit." It was Ries, of course. The physicist looked at him, must have read his mind, and leaped toward his locker.

"What are you madmen up to?" shouted Mallion. "You can't go out to that camera—you'd be a couple of moths in a candle flame, to put it mildly!"

"Use your brain, not your thalamus, Doc," Ries called over his shoulder. Welland said nothing. Two minutes later the pair of madmen were in the air lock, and sixty seconds after that were floating as rapidly as they dared out the tunnel.

The lights were out, but seeing was easy. There was plenty of illumination from the mouth of the tunnel, crooked as the passage was; and the two had to use the filters on their face plates long before they reached the opening. By that time, the very snow around them seemed to be glowing—and may very well have been doing just that, since light must have filtered for some distance in through the packed crystalloids as well as bounced its way around the tunnel bends.

Ries had left his foil shelters at the first bend. There was some loose snow still on hand from his earlier experiments, and they stuffed as much

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of this as they could between the thin metal layers, and took several of the sandwiched slabs with them as they gingerly approached the opening. They held one of the larger of these —about four feet square—ahead of them as they went; but it proved insufficient when they got within a few yards of the mouth. The trouble was not that the shield failed, but that it wasn't big enough; no matter how close to the opening they came, the entire sky remained a sea of flame. They retreated a little way and Ries rapidly altered the foil armor, bending the sheets and wiring them together until he had a beehive-shaped affair large enough to shield a man. He used the last of their snow in this assembly.

Covered almost completely, he went alone to the tunnel mouth, and this time had no trouble. He was able to use a loop of control wire as a safety, and by hooking his toes under this reached the instrument. It had settled quite a bit—its case and mounting had transmitted heat as planned to the broad silver feet, and these had maintained good surface contact. Naturally a good deal of comet material had boiled away from under them, and the whole installation was in a pit over two feet deep and eight in width. The general lowering of the comet's surface was less obvious.

The vanes of the legs were fairly well sunk into the surface, but with gravity as it was, the only difficulty in freeing them was the perennial one —the risk of giving too much upward momentum. Ries avoided this, got camera and mounting loose, and as quickly as possible brought them back into the tunnel. There was no need to disconnect the control wire from the main cable; as Mallion had predicted, both had disappeared. Their explosion had scarred a deep groove along the tunnel wall at several points where they had been close to the side. Ries regretted their loss; without them he had some difficulty getting himself and his burden started downward, and he wanted the camera into the tunnel's relative shelter as quickly as possible. With its heat-shedding "feet" out of contact with the ground, it would not take long to heat up dangerously. Also, with the comet now whipping closer and closer to perihelion, there was already an annoyingly large gap in the photographic record.

Back in the tunnel, Ries improvised another set of shields for the camera and its operator, and checked the one he had used to see how much snow remained in it. There was some, but discouragingly little. He placed his helmet against that of Donegan and spoke—the radios were useless in the Sun's static.

"You can't go out until we get more snow for this thing, and you'll have to come back every few minutes for a refill. I'd do the photography, but you know better than I what has to be taken. I hope you can make out what you need to see through the sixty-five hundred filter in the shield I made for the finder. I'll be back."

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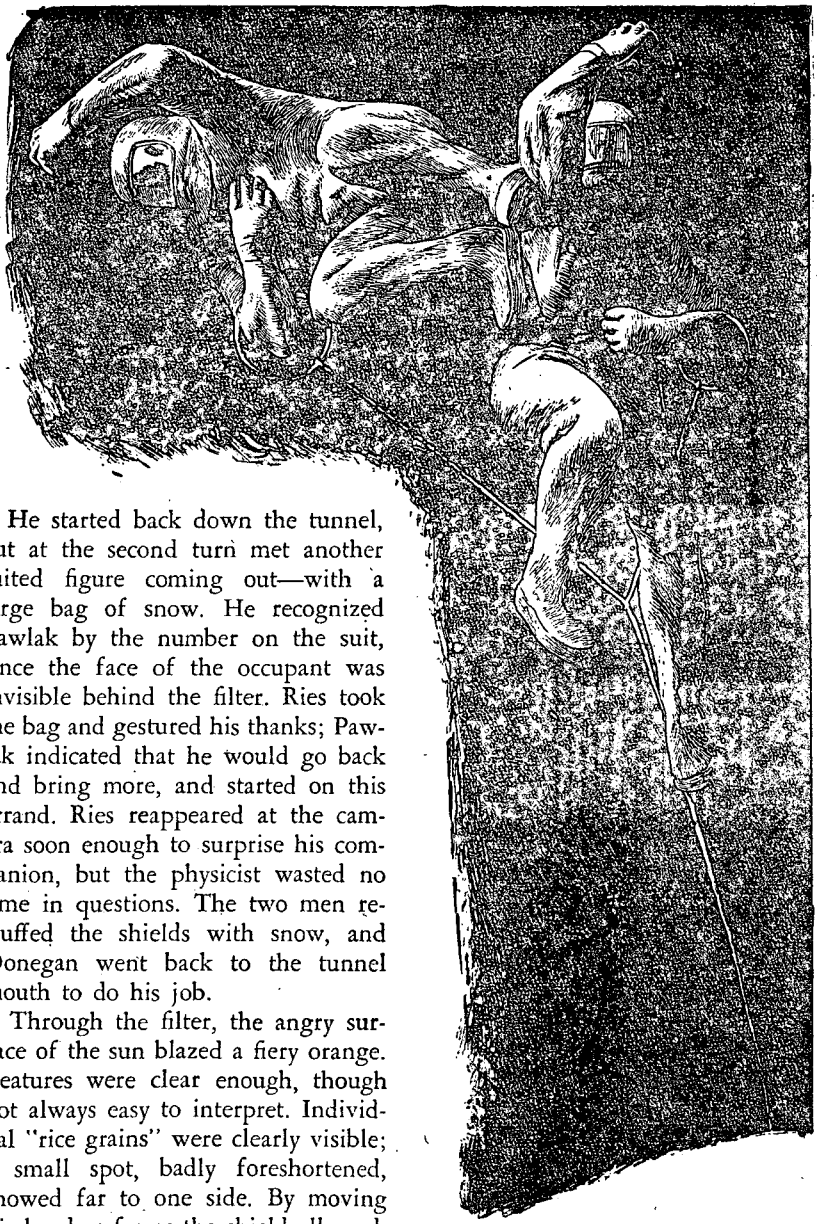

He started back down the tunnel, but at the second turn met another suited figure coming out—with a large bag of snow. He recognized Pawlak by the number on the suit, since the face of the occupant was invisible behind the filter. Ries took the bag and gestured his thanks; Pawlak indicated that he would go back and bring more, and started on this errand. Ries reappeared at the camera soon enough to surprise his companion, but the physicist wasted no time in questions. The two men restuffed the shields with snow, and Donegan went back to the tunnel mouth to do his job.

Through the filter, the angry surface of the sun blazed a fiery orange. Features were clear enough, though not always easy to interpret. Individual "rice grains" were clearly visible; a small spot, badly foreshortened, showed far to one side. By moving his head as far as the shield allowed,

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the observer could see well away from the camera's line of sight; doing this, of course, blued the sun as the ray path difference between the reflecting layers in the filter was shortened. He could not tell exactly what wave length he was using at any given angle, but he quickly learned to make use of the rather crude "tuning" that angle change afforded. He began shooting, first the spot and its neighborhood, altering the camera filter wave length regularly as he did so. Then he found something that might have been a calcium flocculus and took a series around it; then feature after feature caught his eye, and he shot and shot, trying to get each field through the full wavelength range of the camera at about fifty Angstrom intervals plus definite lengths which he knew should be there—the various series lines of hydrogen and of neutral and ionized helium particularly, though he did not neglect such metals as calcium and sodium.

He was distracted by a pull on his armored foot; Ries had come up, inadequately protected by the single remaining sheet of "parasol," to warn him to recharge his own shield. Reluctantly he did so, grudging the time. Ries packed snow against the feet of the camera mounting while Donegan stuffed it between the foil layers of his shield as rapidly as his space-suited hands could work. The moment this was done he headed back to the tunnel mouth, now not so far away as it had been, and resumed operations.

They must have been almost exactly at perihelion then. Donegan neither knew nor cared. He knew that the camera held film enough to let him take one picture a second for about ninety minutes, and he intended to use all of it if he could. He simply scanned the sun as completely as his eyesight, the protecting filter, and his own knowledge permitted, and recorded as completely as possible everything even slightly out of the ordinary that he saw. He knew that many instruments were still at work in the ship, even though many were not, and he knew that some of the devices on the comet's surface would function—or should function—automatically even though remote control was gone; and he intended that there should be a complete record in pictures of everything which might be responsible for whatever those machines recorded. He did a good job.

Not too many—in fact, as time went on, too few—yards below him Ries also worked. If being an instrument maintenance specialist involved moving snow, and in this part of the universe it seemed to involve little else, then he would move snow. He had plenty of it; Pawlak kept bringing more and more bags of the stuff. Also, on his second trip, the engineer produced a lengthy coil of wire; and at the first opportunity Ries fastened one end of this to Donegan's ankle. It served two purposes—it was no longer necessary to go out to let the fellow know by physical contact that his time was getting short, and it let the observer get back to work more

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quickly. Since he was belayed to Ries, who could brace himself against the tunnel walls beyond the bend, there was no worry of going back to the surface too rapidly and being unable to stop.

Ries kept busy. No one ever knew whether he did it silently or not, since the radios were unavailable. It was generally taken for granted that he grumbled as usual, and he may very well have done just that, or even surpassed himself. Hanging weightless in a white-glowing tunnel, trying to read a watch through the heaviest solar filter made for space helmets, holding one end of a line whose other end was keeping a man and a fantastically valuable camera from drifting away and becoming part of the solar corona, all the while trying to organize a number of large plastic sacks of pulverized frozen water, ammonia, and methane which persistently gathered around him would have driven a more self-controlled man than Ries to bad language.

Of course, Donegan didn't map the whole surface. This would take quite a while, using a camera with a half degree field on a surface over ninety-five degrees across, even when the surface in question is partly hidden by the local horizon. It was made even more impossible by their rate of motion; parabolic velocity at a distance of five hundred eighty thousand miles from Sol's center is just about three hundred thirty miles per second, and that produced noticeable relative motion even against a background a hundred and fifty thousand miles away. Features were disappearing below the solar horizon, sometimes, before Donegan could get around to them. Even Ries could think of no solution to this difficulty, when the physicist complained of it on one of his trips for more snow.

At this point, the sun's apparent motion in latitude was more rapid than that in longitude—the comet was changing its direction from the sun more rapidly than it was rotating. The resultant motion across the sky was a little hard to predict, but the physicist knew that the center of the solar disk would set permanently at the latitude of the tunnel mouth an hour and three-quarters after perihelion. The angular size of the disk being what it was, there would be *some* observing after that, but how much depended on what might be called the local time of day, and he had not attempted to figure that out. He simply observed and photographed, except when Ries dragged him forcibly back to get his shield recharged.

Gradually the gigantic disk shrank. It never was far above the local horizon, so there was always something with which to compare it, and the shrinking could be noticed. Also, Ries could tell as time went on that there was a little more snow left in Donegan's shield each time it came back for refilling. Evidently they were past the worst.

But the sun had taken its toll. The mouth of the tunnel was much closer

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to the ship than it had been; several times Ries had been forced back to another section of tunnel with his snow bags, and each resumption of observation by Donegan had involved a shorter trip than before to the surface. Ries, Donegan, and Pawlak were the only members of the expedition to know just how far the evaporation was progressing, since the echo-sounder had been wrecked by the magnetic field; they were never sure afterward whether this was good or not. Those inside were sustained, presumably, by their faith in mathematics. For the physicists this was adequate, but it might not have been for Ries if he had been with them. In any case, he didn't worry much about the fate of the comet after perihelion had been passed; he had too many other troubles, even though his activity had quickly become routine. This left him free to complain —strictly to himself.

Donegan was furious when he finally realized that the sun was going to set at his observing station while it was still close enough to photograph. Like Ries, however, he had no way of expressing his annoyance so that anyone could hear him; and as it turned out, it would have been wasted breath. Observation was cut even shorter by something else.

They had been driven down to what had been originally the third bend in the tunnel, and at this point the passage ran horizontally for a time. Pawlak had just come to the other end of this straight stretch with what he hoped would be his last load of snow when something settled gently through its roof between him and Ries. He leaped toward it, dropping his burden, and discovered that it was one of the instruments which had been on the surface. Its silver cover was slightly corroded, and the feet of its mounting badly so. Apparently its reflecting powers had been lowered by the surface change, and it was absorbing more energy than an equivalent area of comet; so its temperature had gone up accordingly, and it had melted its way below the rest of the surface.

Low as the sun was, it was shining into the hole left by the instrument; evidently the pit it had made was very broad and shallow. Pawlak made his way around the piece of gear and up to Ries, whose attention was directed elsewhere, and reported what had happened. The instrument man looked back down the tunnel and began to haul in on the line attached to Donegan. The physicist was furious when he arrived, and the fact became evident when the three helmets were brought together.

"What in blazes is going on here?" he fulminated. "You can't make me believe my shield had boiled dry again—I haven't been out five minutes, and the loads are lasting longer now. We're losing the sun, you idiot; I can't come back because someone has a brainstorm or can't read a watch—"

Pawlak interrupted by repeating his report. It did not affect Donegan.

"So what?" he blazed. "We ex-

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pected that. All the gear around the tunnel mouth has sunk—we're in a big pit now anyway. That's making things still worse—we'll lose sight of the sun that much sooner. Now let me get back and work!"

"Go back and work if you want, provided you can do anything with the naked eye," retorted Ries, "but the camera's going back to the ship pronto. That's one thing we forgot—or maybe it was just assumed that gaseous ammonia in this concentration and at this temperature wouldn't do anything to silver. Maybe it isn't the ammonia, for all I know; maybe it's something we've been picking up from the corona; but look at that camera of yours! The polish is gone; it's picking up heat much faster than it was expected to, and not getting rid of it any quicker. If that magazine of exposed film you have in there gets too hot, you'll have wasted a lot of work. Now come on, or else let me take the camera back." Ries started along the tunnel without further words, and the physicist followed reluctantly.

Inside, Donegan disappeared with his precious film magazine, without taking time to thank Ries.

"Self-centered character," he muttered. "Not a word to anyone—just off to develop his film before somebody opens the cartridge, I suppose."

"You can't blame him," Ries said mildly. "He did a lot of work for it."

"*He* did a lot of work? How about us? How about you; it was all your idea in the first place—"

"Careful, Joe, or they'll be taking my nickname away from me and giving it to you. Come on; I want to see Doc Sonne. My feet hurt." He made his way to the main deck, and Pawlak drifted after him, grumbling. By the time the engineer arrived, the rest of the group was overwhelming Ries with compliments, and the fellow was grinning broadly. It began to look as though the name "Grumpy" *would* have to find a new owner.

But habit is hard to break. The doctor approached, and without removing his patent's shoes dredged a tube of ointment out of his equipmen bag.

"Burn ointment," the doctor replied. "It'll probably be enough; you shouldn't have taken too bad a dose. I'll have you patched up in a minute. Let's get those shoes off."

"Now wouldn't you know it," said Ries aloud. "Not even the doctor around here can do the right thing at the right time. Physicists who want A's gear fixed on B's time—won't let a man go out to do a job in the only way it can be done—won't give a person time to rest—and now," it was the old Grumpy back again, "a man spends two hours or so swimming around among sacks of frozen methane, which melts at about a hundred and eight-five degrees Centigrade below zero—that's about two hundred and ninety below, Fahrenheit, doctor—and the doctor wants to use *burn ointment*. Break out the frostbite remedy, will you, please? My feet hurt."

THE END

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OOMPHEL . .

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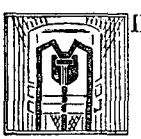
. . IN THE SKY

By H. BEAM PIPER

Since Logic derives from postulates, it never has, and never will, change a postulate. And a religious belief is a system of postulates . . . so how can a man fight a native superstition with logic? Or anything else . . . ?

Illustrated by Bernklau



ILES GILBERT watched the landscape slide away below him, its quilt of rounded treetops mottled red and orange in the double sunlight and, in shaded places, with the natural yellow of the vegetation of Kwannon. The aircar began a slow swing to the left, and Gettler Alpha came into view, a monstrous smear of red incandescence with an optical diameter of two feet at arm's length, slightly flattened on the bottom by the western horizon. In another couple of hours it would be completely set, but by that time Beta, the planet's G-class primary, would be at its midafternoon hottest. He glanced at his watch. It was 1005, but that was Galactic Standard Time, and had no relevance to anything that was happening in the local sky. It did mean, though, that it was five minutes short of two hours to 'cast-time.

He snapped on the communication screen in front of him, and Harry Walsh, the news editor, looked out of it at him from the office in Bluelake, halfway across the continent. He wanted to know how things were going.

"Just about finished. I'm going to look in at a couple more native villages, and then I'm going to Sanders' plantation to see Gonzales. I hope I'll have a personal statement from him, and the final situation-progress map, in time for the 'cast. I take it Maith's still agreeable to releasing the story at twelve-hundred?"

"Sure; he was always agreeable. The Army wants publicity; it was Government House that wanted to sit on it, and they've given that up now. The story's all over the place here, native city and all."

"What's the situation in town, now?"

"Oh, it's still going on. Some disorders, mostly just unrest. Lot of

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street meetings that could have turned into frenzies if the police hadn't broken them up in time. A couple of shootings, some sleep-gassing, and a lot of arrests. Nothing to worry about—at least, not immediately."

That was about what he thought. "Maybe it's not bad to have a little trouble in Bluelake," he considered. "What happens out here in the plantation country the Government House crowd can't see, and it doesn't worry them. Well, I'll call you from Sanders'."

He blanked the screen. In the seat in front, the native pilot said: "Some contragravity up ahead, boss." It sounded like two voices speaking in unison, which was just what it was. "I'll have a look."

The pilot's hand, long and thin, like a squirrel's, reached up and pulled down the fifty-power binoculars on their swinging arm. Miles looked at the screen-map and saw a native village just ahead of the dot of light that marked the position of the aircar. He spoke the native name of the village aloud, and added:

"Let down there, Heshto. I'll see what's going on."

The native, still looking through the glasses, said, "Right, boss." Then he turned.

His skin was blue-gray and looked like sponge rubber. He was humanoid, to the extent of being an upright biped, with two arms, a head on top of shoulders, and a torso that housed, among other oddities, four lungs. His face wasn't even vaguely human. He had two eyes in front, close enough for stereoscopic vision, but that was a common characteristic of sapient life forms everywhere. His mouth was strictly for eating; he breathed through separate intakes and outlets, one of each on either side of his neck; he talked through the outlets and had his scent and hearing organs in the intakes. The car was air-conditioned, which was a mercy; an overheated Kwann exhaled through his skin, and surrounded himself with stenches like an organic chemistry lab. But then, Kwanns didn't come any closer to him than they could help when he was hot and sweated, which, lately, had been most of the time.

"A V and a half of air cavalry, circling around," Heshto said. "Making sure nobody got away. And a combat car at a couple of hundred feet and another one just at treetop level."

He rose and went to the seat next to the pilot, pulling down the binoculars that were focused for his own eyes. With them, he could see the air cavalry—egg-shaped things just big enough for a seated man, with jets and contragravity field generators below and a bristle of machine gun muzzles in front. A couple of them jetted up for a look at him and then went slanting down again, having recognized the Kwannon Planetwide News Service car.

The village was typical enough to have been an illustration in a sociography textbook—fields in a belt for a couple of hundred yards around it, dome-thatched mud-and-wattle huts

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inside a pole stockade with log storehouses built against it, their flat roofs high enough to provide platforms for defending archers, the open oval gathering-place in the middle. There was a big hut at one end of this, the khamdoo, the sanctum of the adult males, off limits for women and children. A small crowd was gathered in front of it; fifteen or twenty Terran air cavalrymen, a couple of enlisted men from the Second Kwannon Native Infantry, a Terran second lieutenant, and half a dozen natives. The rest of the village population, about two hundred, of both sexes and all ages, were lined up on the shadier side of the gathering-place, most of them looking up apprehensively at the two combat cars which were covering them with their guns.

Miles got to his feet as the car lurched off contragravity and the springs of the landing-feet took up the weight. A blast of furnacelike air struck him when he opened the door; he got out quickly and closed it behind him. The second lieutenant had come over to meet him; he extended his hand.

"Good day, Mr. Gilbert. We all owe you our thanks for the warning. This would have been a real baddie if we hadn't caught it when we did."

He didn't even try to make any modest disclaimer; that was nothing more than the exact truth.

"Well, lieutenant, I see you have things in hand here." He glanced at the line-up along the side of the oval plaza, and then at the selected group in front of the khamdoo. The patriarchal village chieftain in a loose slashed shirt; the shoonoo, wearing a multiplicity of amulets and nothing else; four or five of the village elders. "I take it the word of the swarming didn't get this far?"

"No, this crowd still don't know what the flap's about, and I couldn't think of anything to tell them that wouldn't be worse than no explanation at all."

He had noticed hoes and spades flying in the fields, and the cylindrical plastic containers the natives bought from traders, dropped when the troops had surprised the women at work. And the shoonoo didn't have a fire-dance cloak or any other special regalia on. If he'd heard about the swarming, he'd have been dressed to make magic for it.

"What time did you get here, lieutenant?"

"Oh-nine-forty. I just called in and reported the village occupied, and they told me I was the last one in, so the operation's finished."

That had been smart work. He got the lieutenant's name and unit and mentioned it into his memophone. That had been a little under five hours since he had convinced General Maith, in Bluelake, that the mass labor-desertion from the Sanders plantation had been the beginning of a swarming. Some division commanders wouldn't have been able to get a brigade off the ground in that time, let alone landed on objective. He said as much to the young officer.

"The way the Army responded, today, can make the people of the Col-

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ony feel a lot more comfortable for the future."

"Why, thank you, Mr. Gilbert." The Army, on Kwannon, was rather more used to obloquy than praise. "How did you spot what was going on so quickly?"

This was the hundredth time, at least, that he had been asked that today.

"Well, Paul Sanders' labor all comes from neighboring villages. If they'd just wanted to go home and spend the end of the world with their families, they'd have been dribbling away in small batches for the last couple of hundred hours. Instead, they all bugged out in a bunch, they took all the food they could carry and nothing else, and they didn't make any trouble before they left. Then, Sanders said they'd been building fires out in the fallow ground and moaning and chanting around them for a couple of days, and idling on the job. Saving their strength for the trek. And he said they had a shoonoo among them. He's probably the lad who started it. Had a dream from the Gone Ones, I suppose."

"You mean, like this fellow here?" the lieutenant asked. "What are they, Mr. Gilbert; priests?"

He looked quickly at the lieutenant's collar-badges. Yellow trefoil for Third Fleet-Army Force, Roman IV for Fourth Army; 907 for his regiment, with C under it for cavalry. That outfit had only been on Kwannon for the last two thousand hours; but somebody should have briefed him better than that.

He shook his head. "No, they're magicians. Everything these Kwanns do involves magic, and the shoonoon are the professionals. When a native runs into something serious, that his own do-it-yourself magic can't cope with, he goes to the shoonoo. And, of course, the shoonoo works all the magic for the community as a whole—rain-magic, protective magic for the village and the fields, that sort of thing."

The lieutenant mopped his face on a bedraggled handkerchief. "They'll have to struggle along somehow for a while; we have orders to round up all the shoonoon and send them in to Bluelake."

"Yes." That hadn't been General Maith's idea; the governor had insisted on that. "I hope it doesn't make more trouble than it prevents."

The lieutenant was still mopping his face and looking across the gathering-place toward Alpha, glaring above the huts.

"How much worse do you think this is going to get?" he asked.

"The heat, or the native troubles?"

"I was thinking about the heat, but both."

"Well, it'll get hotter. Not much hotter, but some. We can expect storms, too, within twelve to fifteen hundred hours. Nobody has any idea how bad they'll be. The last periastron was ninety years ago, and we've only been here for sixty-odd; all we have is verbal accounts from memory from the natives, probably garbled and exaggerated. We had pretty bad storms right after transit a year ago; they'll

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be much worse this time. Thermal convections; air starts to cool when it gets dark, and then heats up again in double-sun daylight."

It was beginning, even now; starting to blow a little after Alpha-rise.

"How about the natives?" the lieutenant asked. "If they can get any crazier than they are now—"

"They can, and they probably will. They think this is the end of the world. The Last Hot Time." He used the native expression, and then translated it into Lingua Terra. "The Sky Fire—that's Alpha—will burn up the whole world."

"But this happens every ninety years. Mean they always acted this way at periastron?"

He shook his head. "Race would have exterminated itself long ago if they had. No, this is something special. The coming of the Terrans was a sign. The Terrans came and brought oomphel to the world; this a sign that the Last Hot Time is at hand."

"What the devil *is* oomphel?" The lieutenant was mopping the back of his neck with one hand, now, and trying to pull his sticky tunic loose from his body with the other. "I hear that word all the time."

"Well, most Terrans, including the old Kwannon hands, use it to mean trade-goods. To the natives, it means any product of Terran technology, from paper-clips to spaceships. They think it's . . . well, not exactly supernatural; extranatural would be closer to expressing their idea. Terrans are natural; they're just a different kind of people. But oomphel isn't; it isn't subject to any of the laws of nature at all. They're all positive that we don't make it. Some of them even think it makes us."

When he got back in the car, the native pilot, Heshto, was lolling in his seat and staring at the crowd of natives along the side of the gathering-place with undisguised disdain. Heshto had been educated at one of the Native Welfare Commission schools, and post-graded with Kwannon Planetwide News. He could speak, read and write Lingua Terra. He was a mathematician as far as long division and decimal fractions. He knew that Kwannon was the second planet of the Gettler Beta system, 23,000 miles in circumference, rotating on its axis once in 22.8 Galactic Standard hours and making an orbital circuit around Gettler Beta once in 372.06 axial days, and that Alpha was an M-class pulsating variable with an average period of four hundred days, and that Beta orbited around it in a long elipse every ninety years. He didn't believe there was going to be a Last Hot Time. He was an intellectual, he was.

He started the contragravity-field generator as soon as Miles was in his seat. "Where now, boss?" he asked.

"Qualpha's Village. We won't let down; just circle low over it I want some views of the ruins. Then to Sanders' plantation."

"O.K., boss; hold tight."

He had the car up to ten thousand feet. Aiming it in the map direction of Qualpha's Village, he let go with

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everything he had—hot jets, rocket-booster and all. The forest landscape came hurtling out of the horizon toward them.

Qualpha's was where the trouble had first broken out, after the bug-out from Sanders; the troops hadn't been able to get there in time, and it had been burned. Another village, about the same distance south of the plantation, had also gone up in flames, and at a dozen more they had found the natives working themselves into frenzies and had had to sleep-gas them or stun them with concussion-bombs. Those had been the villages to which the deserters from Sanders' had themselves gone; from every one, runners had gone out to neighboring villages— "The Gone Ones are returning; all the People go to greet them at the Deesha-Phoo. Burn your villages; send on the word. Hasten; the Gone Ones return!"

Saving some of those villages had been touch-and-go, too; the runners, with hours lead-time, had gotten there ahead of the troops, and there had been shooting at a couple of them. Then the Army contragravity began landing at villages that couldn't have been reached in hours by foot messengers. It had been stopped—at least for the time, and in this area. When and where another would break out was anybody's guess.

The car was slowing and losing altitude, and ahead he could see thin smoke rising above the trees. He moved forward beside the pilot and pulled down his glasses; with them he could distinguish the ruins of the village. He called Bluelake, and then put his face to the view-finder and began transmitting in the view.

It had been a village like the one he had just visited, mud-and-wattle huts around an oval gathering-place, stockade, and fields beyond. Heshto brought the car down to a few hundred feet and came coasting in on momentum helped by an occasional spurt of the cold-jets. A few sections of the stockade still stood, and one side of the khamdoo hadn't fallen, but the rest of the structures were flat. There wasn't a soul, human or parahuman, in sight; the only living thing was a small black-and-gray quadruped investigating some bundles that had been dropped in the fields, in hope of finding something tasty. He got a view of that—everybody liked animal pictures on a newscast—and then he was swinging the pickup over the still-burning ruins. In the ashes of every hut he could see the remains of something like a viewscreen or a nuclear-electric stove or a refrigerator or a sewing machine. He knew how dearly the Kwanns cherished such possessions. That they had destroyed them grieved him. But the Last Hot Time was at hand; the whole world would be destroyed by fire, and then the Gone Ones would return.

So there were uprisings on the plantations. Paul Sanders had been lucky; his Kwanns had just picked up and left. But he had always gotten along well with the natives, and his plantation house was literally a cas-

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tle and he had plenty of armament. There had been other planters who had made the double mistake of incurring the enmity of their native labor and of living in unfortified houses. A lot of them weren't around, any more, and their plantations were gutted ruins.

And there were plantations on which the natives had destroyed the klooba plants and smashed the crystal which lived symbiotically upon them. They thought the Terrans were using the living crystals to make magic. Not too far off, at that; the properties of Kwannon biocrystals had opened a major breakthrough in subnucleonic physics and initiated half a dozen technologies. New kinds of oomphel. And down in the south, where the spongy and resinous trees were drying in the heat, they were starting forest fires and perishing in them in hecatombs. And to the north, they were swarming into the mountains; building great fires there, too, and attacking the Terran radar and radio beacons.

Fire was a factor common to all these frenzies. Nothing could happen without magical assistance; the way to bring on the Last Hot Time was People.

Maybe the ones who died in the frenzies and the swarmings were the lucky ones at that. They wouldn't live to be crushed by disappointment when the Sky Fire receded as Beta went into the long swing toward apastron. The surviving shoonoon wouldn't be the lucky ones, that was for sure. The magician-in-public-practice needs only to make one really bad mistake before he is done to some unpleasantly ingenious death by his clientry, and this was going to turn out to be the biggest magico-prophetic blooper in all the long unrecorded history of Kwannon.

A few minutes after the car turned south from the ruined village, he could see contragravity-vehicles in the air ahead, and then the fields and buildings of the Sanders plantation. A lot more contragravity was grounded in the fallow fields, and there were rows of pneumatic balloon-tents, and field-kitchens, and a whole park of engineering equipment. Work was going on in the klooba-fields, too; about three hundred natives were cutting open the six-foot leafy balls and getting out the biocrystals. Three of the plantation airjeeps, each with a pair of machine guns, were guarding them, but they didn't seem to be having any trouble. He saw Sanders in another jeep, and had Heshto put the car alongside.

"How's it going, Paul?" he asked over his radio. "I see you have some help, now."

"Everybody's from Qualpha's, and from Darshat's," Sanders replied. "The Army had no place to put them, after they burned themselves out." He laughed happily. "Miles, I'm going to save my whole crop! I thought I was wiped out, this morning."

He would have been, if Gonzales hadn't brought those Kwanns in. The klooba was beginning to wither; if left unharvested, the biocrystals would die along with their hosts and crack

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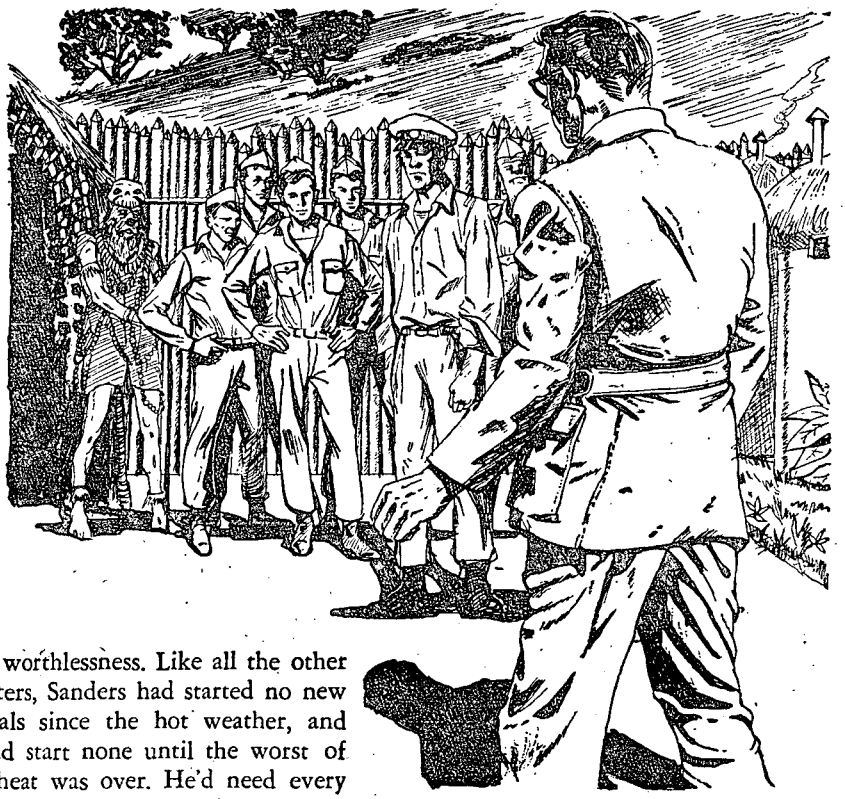

into worthlessness. Like all the other planters, Sanders had started no new crystals since the hot weather, and would start none until the worst of the heat was over. He'd need every crystal he could sell to tide him over.

"The Welfarers'll make a big forced-labor scandal out of this," he predicted.

"Why, such an idea." Sanders was scandalized. "I'm not forcing them to eat."

"The Welfarers don't think anybody ought to have to work to eat. They think everybody ought to be fed whether they do anything to earn it or not, and if you try to make people earn their food, you're guilty of economic coercion. And if you're in business for yourself and want them to work for you, you're an exploiter and you ought to be eliminated as a class. Haven't you been trying to run a plantation on this planet, under this Colonial Government, long enough to have found that out, Paul?"

Brigadier General Ramón Gonzales had taken over the first—counting down from the landing-stage—floor of the plantation house for his headquarters. His headquarters company had pulled out removable partitions and turned four rooms into one, and

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moved in enough screens and teleprinters and photoprint machines and computers to have outfitted the main newsroom of *Planetwide News*. The place had the feel of a newsroom—a newsroom after a big story has broken and the 'cast has gone on the air and everybody—in this case about twenty Terran officers and non-coms, half women—standing about watching screens and smoking and thinking about getting a follow-up ready.

Gonzales himself was relaxing in Sanders' business-room, with his belt off and his tunic open. He had black eyes and black hair and mustache, and a slightly equine face that went well with his Old Terran Spanish name. There was another officer with him, considerably younger—Captain Foxx Travis, Major General Maith's aide.

"Well, is there anything we can do for you, Miles?" Gonzales asked, after they had exchanged greetings and sat down.

"Why, could I have your final situation-progress map? And would you be willing to make a statement on audio-visual." He looked at his watch. "We have about twenty minutes before the 'cast."

"You have a map," Gonzales said, as though he were walking tiptoe from one word to another. "It accurately represents the situation as of the moment, but I'm afraid some minor unavoidable inaccuracies may have crept in while marking the positions and times for the earlier phases of the operation. I teleprinted a copy to *Planetwide* along with the one I sent to Division Headquarters."

He understood about that and nodded. Gonzales was zipping up his tunic and putting on his belt and sidearm. That told him, before the brigadier general spoke again, that he was agreeable to the audio-visual appearance and statement. He called the recording studio at *Planetwide* while Gonzales was inspecting himself in the mirror and told them to get set for a recording. It only ran a few minutes; Gonzales, speaking without notes, gave a brief description of the operation.

"At present," he concluded, "we have every native village and every plantation and trading-post within two hundrd miles of the Sanders plantation occupied. We feel that this swarming has been definitely stopped, but we will continue the occupation for at least the next hundred to two hundred hours. In the meantime, the natives in the occupied villages are being put to work building shelters for themselves against the anticipated storms."

"I hadn't heard about that," Miles said, as the general returned to his chair and picked up his drink again.

"Yes. They'll need something better than these thatched huts when the storms start, and working on them will keep them out of mischief. Standard megaton-kilometer field shelters, earth and log construction. I think they'll be adequate for anything that happens at periastron."

Anything designed to resist the heat, blast and radiaion effects of a megaton thermonuclear bomb at a kilometer ought to stand up under

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what was coming. At least, the periastron effects; there was another angle to it.

"The Native Welfare Commission isn't going to take kindly to that. That's supposed to be their job."

"Then why the devil haven't they done it?" Gonzales demanded angrily. "I've viewed every native village in this area by screen, and I haven't seen one that's equipped with anything better than those log storage-bins against the stockades."

"There was a project to provide shelters for the periastron storms set up ten years ago. They spent one year arguing about how the natives survived storms prior to the Terrans' arrival here. According to the older natives, they got into those log storage-houses you were mentioning; only about one out of three in any village survived. I could have told them that. Did tell them, repeatedly, on the air. Then, after they decided that shelters were needed, they spent another year hassling over who would be responsible for designing them. Your predecessor here, General Nokami, offered the services of his engineer officers. He was frostily informed that this was a humanitarian and not a military project."

Ramon Gonzales began swearing, then apologized for the interruption. "Then what?" he asked.

"Apology unnecessary. Then they did get a shelter designed, and started teaching some of the students at the native schools how to build them, and then the meteorologists told them it was no good. It was a dugout shelter; the weathermen said there'd be rainfall measured in meters instead of inches and anybody who got caught in one of those dugouts would be drowned like a rat."

"Ha, I thought of that one." Gonzales said. "My shelters are going to be mounded up eight feet above the ground."

"What did they do then?" Foxx Travis wanted to know.

"There the matter rested. As far as I know, nothing has been done on it since."

"And you think, with a disgraceful record of non-accomplishment like that, that they'll protest General Gonzales' action on purely jurisdictional grounds?" Travis demanded.

"Not jurisdictional grounds, Foxx. The general's going at this the wrong way. He actually knows what has to be done and how to do it, and he's going right ahead and doing it, without holding a dozen conferences and round-table discussions and giving everybody a fair and equal chance to foul things up for him. You know as well as I do that that's undemocratic. And what's worse, he's making the natives build them themselves, whether they want to or not, and that's forced labor. That reminds me; has anybody started raising the devil about those Kwanns from Qualpha's and Darshat's you brought here and Paul put to work?"

Gonzales looked at Travis and then said: "Not with me. Not yet, anyhow."

"They've been at General Maith,"

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Travis said shortly. After a moment, he added: "General Maith supports General Gonzales completely; that's for publication. I'm authorized to say so. What else was there to do? They'd burned their villages and all their food stores. They had to be placed somewhere. And why in the name of reason should they sit around in the shade eating Government native-type rations while Paul Sanders has fifty to a hundred thousand sols' worth of crystals dying on him?"

"Yes; that's another thing they'll scream about. Paul's making a profit out of it."

"Of course he's making a profit," Gonzales said. "Why else is he running a plantation? If planters didn't make profits, who'd grow biocrystals?"

"The Colonial Government. The same way they built those storm-shelters. But that would be in the public interest, and if the Kwanns weren't public-spirited enough to do the work, they'd be made to—at about half what planters like Sanders are paying them now. But don't you realize that profit is sordid and dishonest and selfish? Not at all like drawing a salary-cum-expense-account from the Government."

"You're right, it isn't," Gonzales agreed. "People like Paul Sanders have ability. If they don't, they don't stay in business. You have ability and people who don't never forgive you for it. Your very existence is a constant reproach to them."

"That's right. And they can't admit your ability without admitting their own inferiority, so it isn't ability at all. It's just dirty underhanded trickery and selfish ruthlessness." He thought for a moment. "How did Government House find out about these Kwanns here?"

"The Welfare Commission had people out while I was still setting up headquarters," Gonzales said. "That was about oh-seven-hundred."

"This isn't for publication?" Travis asked. "Well, they know, but they can't prove, that our given reason for moving in here in force is false. Of course, we can't change our story now; that's why the situation-progress map that was prepared for publication is incorrect as to the earlier phases. They do not know that it was you who gave us our first warning; they ascribe that to Sanders. And they are claiming that there never was any swarming; according to them, Sanders' natives are striking for better pay and conditions, and Sanders got General Maith to use troops to break the strike. I wish we could give you credit for putting us onto this, but it's too late now."

He nodded. The story was that a battalion of infantry had been sent in to rescue a small detail under attack by natives, and that more troops had been sent in to re-enforce them, until the whole of Gonzales' brigade had been committed.

"That wasted an hour, at the start," Gonzales said. "We lost two native villages burned, and about two dozen casualties, because we couldn't get our full strength in soon enough."

"You'd have lost more than that if Maith had told the governor general

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the truth and requested orders to act. There'd be a hundred villages and a dozen plantations and trading posts burning, now, and Lord knows how many dead, and the governor general would still be arguing about whether he was justified in ordering troop-action." He mentioned several other occasions when something like that had happened. "You can't tell that kind of people the truth. They won't believe it. It doesn't agree with their preconceptions."

Foxx Travis nodded. "I take it we are still talking for nonpublication?" When Miles nodded, he continued: "This whole situation is baffling, Miles. It seems that the government here knew all about the weather conditions they could expect at periastron, and had made plans for them. Some of them excellent plans, too, but all based on the presumption that the natives would co-operate or at least not obstruct. You see what the situation actually is. It should be obvious to everybody that the behavior of these natives is nullifying everything the civil government is trying to do to ensure the survival of the Terran colonists, the production of Terran-type food without which we would all starve, the biocrystal plantations without which the Colony would perish, and even the natives themselves. Yet the Civil Government will not act to stop these native frenzies and swarmings which endanger everything and everybody here, and when the Army attempts to act, we must use every sort of shabby subterfuge and deceit or the Civil Government will prevent us. What ails these people?"

"You have the whole history of the Colony against you, Foxx," he said. "You know, there never was any Chartered Kwannon Company set up to exploit the resources of the planet. At first, nobody realized that there were any resources worth exploiting. This plan was just a scientific curiosity; it was and is still the only planet of a binary system with a native population of sapient beings. The first people who came here were scientists, mostly sociographers and para-anthropologists. And most of them came from the University of Adelaide."

Travis nodded. Adelaide had a Federation-wide reputation for left-wing neo-Marxist "liberalism."

"Well, that established the political and social orientation of the Colonial Government, right at the start, when study of the natives was the only business of the Colony. You know how these ideological cliques form in a government—or any other organization. Subordinates are always chosen for their agreement with the views of their superiors, and the extremists always get to the top and shove the moderates under or out. Well, the Native Affairs Administration became the tail that wagged the Government dog, and the Native Welfare Commission is the big muscle in the tail."

His parents hadn't been of the left-wing Adelaide clique. His mother had been a biochemist; his father a roving news correspondent who had drifted into trading with the natives

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and made a fortune in keffa-gum before the chemists on Terra had found out how to synthesize hopkinsine.

"When the biocrystals were discovered and the plantations started, the Government attitude was set. Biocrysal culture is just sordid money grubbing. The real business of the Colony is to promote the betterment of the natives, as defined in University of Adelaide terms. That's to say, convert them into ersatz Terrans. You know why General Maith ordered these shoonoon rounded up?"

Travis made a face. "Governor general Kovac insisted on it; General Maith thought that a few minor concessions would help him on his main objective, which was keeping a swarming from starting out here."

"Yes. The Commissioner of Native Welfare wanted that done, mainly at the urging of the Director of Economic, Educational and Technical Assistance. The EETA crowd don't like shoonoon. They have been trying, ever since their agency was set up, to undermine and destroy their influence with the natives. This looked like a good chance to get rid of some of them."

Travis nodded. "Yes. And as soon as the disturbances in Bluelake started, the Constabulary started rounding them up there, too, and at the evacuee cantonments. They got about fifty of them, mostly from the cantonments east of the city—the natives brought in from the flooded tidewater area. They just dumped the lot of them onto us. We have them penned up in a lorry-hangar on the military reservation now." He turned to Gonzales. "How many do you think you'll gather up out here, general?" he asked.

"I'd say about a hundred and fifty, when we have them all."

Travis groaned. "We can't keep all of them in that hangar, and we don't have anywhere else—"

Sometimes a new idea sneaked up on Miles, rubbing against him and purring like a cat. Sometimes one hit him like a sledgehammer. This one just seemed to grow inside him.

"Foxx, you know I have the top three floors of the Suzikami Building; about five hundred hours ago, I leased the fourth and fifth floors, directly below. I haven't done anything with them, yet; they're just as they were when Trans-Sapce Imports moved out. There are ample water, light, power, air-conditioning and toilet facilities, and they can be sealed off completely from the rest of the building. If General Maith's agreeable, I'll take his shoonoon off his hands."

"What in blazes will you do with them?"

"Try a little experiment in psychological warfare. At minimum, we may get a little better insight into why these natives think the Last Hot Time is coming. At best, we may be able to stop the whole thing and get them quieted down again."

"Even the minimum's worth trying for," Travis said. "What do you have in mind, Miles? I mean, what procedure?"

"Well, I'm not quite sure, yet." That was a lie; he was very sure. He didn't think it was quite time to be

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specific, though. "I'll have to size up my material a little, before I decide on what to do with it. Whatever happens, it won't hurt the shoonoon, and it won't make any more trouble than arresting them has made already. I'm sure we can learn something from them, at least."

Travis nodded. "General Maith is very much impressed with your grasp of native psychology," he said. "What happened out here this morning was exactly as you predicted. Whatever my recommendation's worth, you have it. Can you trust your native driver to take your car back to Bluelake alone?"

"Yes, of course."

"Then suppose you ride in with me in my car. We'll talk about it on the way in, and go see General Maith at once."

Bluelake was peaceful as they flew in over it, but it was an uneasy peace. They began running into military contragravity twenty miles beyond the open farmlands—they were the chlorophyll green of Terran vegetation—and the natives at work in the fields were being watched by more military and police vehicles. The carniculture plants, where Terran-type animal tissue was grown in nutrient-vats, were even more heavily guarded, and the native city was being patroled from above and the streets were empty, even of the hordes of native children who usually played in them.

The Terran city had no streets. Its dwellers moved about on contragravity, and tall buildings rose singly or in clumps, among the landing-staged residences and the green transplanted trees. There was a triple wire fence around it, the inner one masked by vines and the middle one electrified, with warning lights on. Even a government dedicated to the betterment of the natives and unwilling to order military action against them was, it appeared, unwilling to take too many chances.

Major General Denis Maith, the Federation Army commander on Kwannon, was considerably more than willing to find a temporary home for his witch doctors, now numbering close to two hundred. He did insist that they be kept under military guard, and on assigning his aide, Captain Travis, to co-operate on the project. Beyond that, he gave Miles a free hand.

Miles and Travis got very little rest in the next ten hours. A half-company of engineer troops was also kept busy, as were a number of Kwannon Planetwide News technicians and some Terran and native mechanics borrowed from different private business concerns in the city. Even the most guarded hints of what he had in mind were enough to get this last co-operation; he had been running a news-service in Bluelake long enough to have the confidence of the business people.

He tried, as far as possible, to keep any intimation of what was going on from Government House. That, unfortunately, hadn't been far enough. He found that out when General Maith was on his screen, in the middle

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of the work on the fourth and fifth floors of the Suzikami Building.

"The governor general just screened me," Maith said. "He's in a tizzy about our shoonoon. Claims that keeping them in the Suzikami Building will endanger the whole Terran city."

"Is that the best he can do? Well, that's rubbish, and he knows it. There are less than two hundred of them, I have them on the fifth floor, twenty stories above the ground, and the floor's completely sealed off from the floor below. They can't get out, and I have tanks of sleep-gas all over the place which can be opened either individually or all together from a switch on the fourth floor, where your sepoys are quartered."

"I know, Mr. Gilbert; I screen-viewed the whole installation. I've seen regular maximum-security prisons that would be easier to get out of."

"Governor general Kovac is not objecting personally. He has been pressured into it by this Native Welfare government-within-the-Government. They don't know what I'm doing with those shoonoon, but whatever it is, they're afraid of it."

"Well, for the present," Maith said, "I think I'm holding them off. The Civil Government doesn't want the responsibility of keeping them in custody, I refused to assume responsibility for them if they were kept anywhere else, and Kovac simply won't consider releasing them, so that leaves things as they are. I did have to make one compromise, though." That didn't sound good. It sounded less so when Maith continued: "They insisted on having one of their people at the Suzikami Building as an observer. I had to grant that."

"That's going to mean trouble."

"Oh, I shouldn't think so. This observer will observe, and nothing else. She will take no part in anything you're doing, will voice no objections, and will not interrupt anything you are saying to the shoonoon. I was quite firm on that, and the governor general agreed completely."

"She?"

"Yes. A Miss Edith Shaw; do you know anything about her?"

"I've met her a few times; cocktail parties and so on." She was young enough, and new enough to Kwannon, not to have a completely indurated mind. On the other hand, she was EETA which was bad, and had a master's in sociography from Adelaide, which was worse. "When can I look for her?"

"Well, the governor general's going to screen me and find out when you'll have the shoonoon on hand."

Doesn't want to talk to me at all, Miles thought. Afraid he might say something and get quoted.

"For your information, they'll be here inside an hour. They will have to eat, and they're all tired and sleepy. I should say bout oh-eight-hundred. Oh, and will you tell the governor general to tell Miss Shaw to bring an overnight kit with her. She's going to need it."

He was up at 0400, just a little after Beta-rise. He might be a civilian

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big-wheel in an Army psychological warfare project, but he still had four newscasts a day to produce. He spent a couple of hours checking the 0600 'cast and briefing Harry Walsh for the indeterminate period in which he would be acting chief editor and producer. At 0700, Foxx Travis put in an appearance. They went down to the fourth floor, to the little room they had fitted out as command-post, control room and office for Operation Shoonoo.

There was a rectangular black traveling-case, initialed E. S., beside the open office door. Travis nodded at it, and they grinned at one another; she'd come early, possibly hoping to catch them hiding something they didn't want her to see. Entering the office quietly, they found her seated facing the big viewscreen, smoking and watching a couple of enlisted men of the First Kwannon Native Infantry at work in another room where the pickup was. There were close to a dozen lipstick-tinted cigarette butts in the ashtray beside her. Her private face wasn't particularly happy. Maybe she was being earnest and concerned about the betterment of the underpriviledged, or the satanic maneuvers of the selfish planters.

Then she realized that somebody had entered; with a slight start, she turned, then rose. She was about the height of Foxx Travis, a few inches shorter than Miles, and slender. Light blond; green suit costume. She ditched her private face and got on her public one, a pleasant and deferential smile, with a trace of uncertainty behind it. Miles introduced Travis, and they sat down again facing the screen.

It gave a view, from one of the long sides and near the ceiling, of a big room. In the center, a number of seats—the drum-shaped cushions the natives had adopted in place of the seats carved from sections of tree trunk that they had been using when the Terrans had come to Kwannon—were arranged in a semicircle, one in the middle slightly in advance of the others. Facing them were three armchairs, a remote-control box beside one and another Kwann cushion behind and between the other two. There was a large globe of Kwannon, and on the wall behind the chairs an array of viewscreens.

"There'll be an interpreter, a native Army sergeant, between you and Captain Travis." he said. "I don't know how good you are with native languages, Miss Shaw; the captain is not very fluent."

"Cushions for them, I see, and chairs for the lordly Terrans," she commented. "Never miss a chance to rub our superiority in, do you?"

"I never deliberately force them to adopt our ways," he replied. "Our chairs are as uncomfortable for them as their low seats are for us. Difference, you know, doesn't mean inferiority or superiority. It just means difference."

"Well, what are you trying to do, here?"

"I'm trying to find out a little more about the psychology back of these frenzies and swarmings."

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"It hasn't occurred to you to look for them in the economic wrongs these people are suffering at the hands of the planters and traders, I suppose."

"So they're committing suicide, and that's all you can call these swarmings, and the fire-frenzies in the south, from economic motives," Travis said. "How does one better oneself economically by dying?"

She ignored the question, which was easier than trying to answer it.

"And why are you bothering to talk to these witch doctors? They aren't representative of the native people. They're a lot of cynical charlatans, with a vested interest in ignorance and superstition—"

"Miss Shaw, for the past eight centuries, earnest souls have been bewailing the fact that progress in the social sciences has always lagged behind progress in the physical sciences. I would suggest that the explanation might be in difference of approach. The physical scientist works *with* physical forces, even when he is trying, as in the case of contragravity, to nullify them. The social scientist works *against* social forces."

"And the result's usually a miserable failure, even on the physical-accomplishment level," Foxx Travis added. "This storm shelter project that was set up ten years ago and got nowhere, for instance. Ramón Gonzales set up a shelter project of his own seventy-five hours ago, and he's half through with it now."

"Yes, by forced labor!"

"Field surgery's brutal, too, especially when the anaesthetics run out. It's better than letting your wounded die, though."

"Well, we were talking about these shoonoon. They are a force among the natives; that can't be denied. So, since we want to influence the natives, why not use them?"

"Mr. Gilbert, these shoonoon are blocking everything we are trying to do for the natives. If you use them for propaganda work in the villages, you will only increase their prestige and make it that much harder for us to better the natives' condition, both economically and culturally—"

"That's it, Miles," Travis said. "She isn't interested in facts about specific humanoid people on Kwannon. She has a lot of high-order abstractions she got in a classroom at Adelaide on Terra."

"No. Her idea of bettering the natives' condition is to rope in a lot of young Kwanns, put them in Government schools, overload them with information they aren't prepared to digest, teach them to despise their own people, and then send them out to the villages, where they behave with such insufferable arrogance that the wonder is that so few of them stop an arrow or a charge of buckshot, instead of so many. And when that happens, as it does occasionally, Welfare says they're murdered at the instigation of the shoonoon."

"You know, Miss Shaw, this isn't just the roughneck's scorn for the egghead," Travis said. "Miles went to school on Terra, and majored in ex-

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traterrestrial sociography, and got a master's, just like you did. At Montevideo," he added. "And he spent two more years traveling on a Paula von Schlicten Fellowship."

Edith Shaw didn't say anything. She even tried desperately not to look impressed. It occurred to him that he'd never mentioned that fellowship to Travis. Army Intelligence must have a pretty good *dossier* on him. Before anybody could say anything further, a Terran captain and a native sergeant of the First K.N.I. came in. In the screen, the four sepoys who had been fussing around straightening things picked up auto-carbines and posted themselves two on either side of a door across from the pickup, taking positions that would permit them to fire into whatever came through without hitting each other.

What came through was one hundred and eighty-four shoonoon. Some wore robes of loose gauze strips, and some wore fire-dance cloaks of red and yellow and orange ribbons. Many were almost completely naked, but they were all amulet-ed to the teeth. There must have been a couple of miles of brass and bright-alloy wire among them, and half a ton of bright scrap-metal, and the skulls, bones, claws, teeth, tails and other components of most of the native fauna. They debouched into the big room, stopped, and stood looking around them. A native sergeant and a couple more sepoys followed. They got the shoonoon over to the semicircle of cushions, having to chase a couple of them away from the single seat at front and center, and induced them to sit down.

The native sergeant in the little room said something under his breath; the captain laughed. Edith Shaw gaped for an instant and said, *"Muggawsh!"* Travis simply remarked that he'd be damned.

"They do look kind of unusual, don't they?" Miles said. "I wouldn't doubt that this is the biggest assemblage of shoonoon in history. They aren't exactly a gregarious lot."

"Maybe this is the beginning of a new era. First meeting of the Kwannon Thaumaturgical Society."

A couple more K.N.I. privates came in with serving-tables on contragravity floats and began passing bowls of a frozen native-food delicacy of which all Kwanns had become passionately fond since its introduction by the Terrans. He let them finish, and then, after they had been relieved of the empty bowls, he nodded to the K.N.I. sergeant, who opened a door on the left. They all went through into the room they had been seeing in the screen. There was a stir when the shoonoon saw him, and he heard his name, in its usual native mispronunciation, repeated back and forth.

"You all know me," he said, after they were seated. "Have I ever been an enemy to you or to the People?"

"No," one of them said. "He speaks for us to the other Terrans. When we are wronged, he tries to get the wrongs righted. In times of famine he has spoken of our troubles, and gifts of food have come while the

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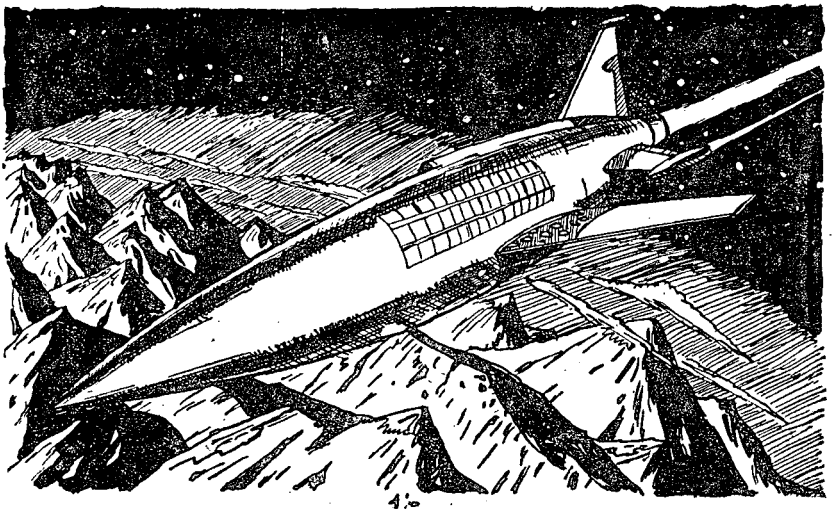

Government argued about what to do."

He wished he could see Edith Shaw's face.

"There was a sickness in our village, and my magic could not cure it," another said. "Mailsh Heelbare gave me oomphel to cure it, and told me how to use it. He did this privately, so that I would not be made to look small to the people of the village."

And that had infuriated EETA; it was a question whether unofficial help to the natives or support of the prestige of a shoonoo had angered them more.

"His father was a trader; he gave good oomphel, and did not cheat. Mailsh Heelbare grew up among us; he took the Manhood Test with the boys of the village," another oldster said. "He listened with respect to the grandfather-stories. No, Mailsh Heelbare is not our enemy. He is our friend."

"And so I will prove myself now," he told them. "The Government is angry with the People, but I will try to take their anger away, and in the meantime I am permitted to come here and talk with you. Here is a chief of soldiers, and one of the Government people, and your words will be heard by the oomphel machine that remembers and repeats, for the Governor and the Great Soldier Chief."

They all brightened. To make a voice recording was a wonderful honor. Then one of them said:

"But what good will that do now? The Last Hot Time is here. Let us be permitted to return to our villages, where our people need us."

"It is of that that I wish to speak. But first of all, I must hear your words, and know what is in your minds. Who is the eldest among you?

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Let him come forth and sit in the front, where I may speak with him."

Then he relaxed while they argued in respectfully subdued voices. Finally one decrepit oldster, wearing a cloak of yellow ribbons and carrying a highly obscene and ineffably sacred wooden image, was brought forward and installed on the front-and-center cushion. He'd come from some village to the west that hadn't gotten the word of the swarming; Gonzales' men had snagged him while he was making crop-fertility magic.

Miles showed him the respect due his advanced age and obviously great magical powers, displaying, as he did, an understanding of the regalia.

"I have indeed lived long," the old shoonoo replied. "I saw the Hot Time before; I was a child of so high." He measured about two and a half feet off the floor; that would make him ninety-five or thereabouts. "I remember it."

"Speak to us, then. Tell us of the Gone Ones, and of the Sky Fire, and of the Last Hot Time. Speak as though you alone knew these things, and as though you were teaching me."

Delighted, the oldster whooshed a couple of times to clear his outlets and began:

"In the long-ago time, there was only the Great Spirit. The Great Spirit made the World, and he made the People. In that time, there were no more People in the World then would be in one village, now. The Gone Ones dwelt among them, and spoke to them as I speak to you. Then, as more People were born, and died and went to join the Gone Ones, the Gone Ones became many, and they went away and build a place for themselves, and built the Sky Fire around it, and in the Place of the Gone Ones, at the middle of the Sky Fire, it is cool. From their place in the Sky Fire, the Gone Ones send wisdom to the people in dreams.

"The Sky Fire passes across the sky, from east to west, as the Always-Same does, but it is farther away than the Always-Same, because sometimes the Always Same passes in front of it, but the Sky Fire never passes in front of the Always-Same. None of the grandfather-stories, not even the oldest, tell of a time when this happened.

"Sometimes the Sky Fire is big and bright; that is when the Gone Ones feast and dance. Sometimes it is smaller and dimmer; then the Gone Ones rest and sleep. Sometimes it is close, and there is a Hot Time; sometimes it goes far away, and then there is a Cool Time.

"Now, the Last Hot Time has come. The Sky Fire will come closer and closer, and it will pass the Always-Same, and then it will burn up the World. Then will be a new World, and the Gone Ones will return, and the People will be given new bodies. When this happens, the Sky Fire will go out, and the Gone Ones will live in the World again with the People; the Gone Ones will make great magic and teach wisdom as I teach to you, and will no longer have to send dreams. In that time the crops will grow without planting or tending or

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the work of women; in that time, the game will come into the villages to be killed in the gathering-places. There will be no more hunger and no more hard work, and no more of the People will die or be slain. And that time is now here," he finished. "All the People know this."

"Tell me, Grandfather; how is this known? There have been many Hot Times before. Why should this one be the Last Hot Time?"

"The Terrans have come, and brought oomphel into the World," the old shoonoo said. "It is a sign."

"It was not prophesied beforetime. None of the People had prophesies of the coming of the Terrans. I ask you, who were the father of children and the grandfather of children's children when the Terrans came; was there any such prophesy?"

The old shoonoo was silent, turning his pornographic ikon in his hands and looked at it.

"No," he admitted, at length. "Before the Terrans came, there were no prophesies among the People of their coming. Afterward, of course, there were many such prophesies, but there were none before."

"That is strange. When a happening is a sign of something to come, it is prophesied beforetime." He left that seed of doubt alone to grow, and continued: "Now, Grandfather, speak to us about what the People believe concerning the Terrans."

"The Terrans came to the World when my eldest daughter bore her first child," the old shoonoo said. "They came in great round ships, such as come often now, but which had never before been seen. They said that they came from another world like the World of People, but so far away that even the Sky Fire could not be seen from it. They still say this, and many of the People believe it, but it is not real.

"At first, it was thought that the Terrans were great shoonoon who made powerful magic, but this is not real either. The Terrans have no magic and no wisdom of their own. All they have is the oomphel, and the oomphel works magic for them and teaches them their wisdom. Even in the schools which the Terrans have made for the People, it is the oomphel which teaches." He went on to describe, not too incorrectly, the reading-screens and viewscreens and audio-visual equipment. "Nor do the Terrans make the oomphel, as they say. The oomphel makes more oomphel for them."

"Then where did the Terrans get the first oomphel?"

"They stole it from the Gone Ones,' the old shoonoo replied. "The Gone Ones make it in their place in the middle of the Sky Fire, for themselves and to give to the People when they return. The Terrans stole it from them. For this reason, there is much hatred of the Terrans among the People. The Terrans live in the Dark Place, under the World, where the Sky Fire and the Always-Same go when they are not in the sky. It is there that the Terrans get the oomphel from the Gone Ones, and now

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they have come to the World, and they are using oomphel to hold back the Sky-Fire and keep it beyond the Always-Same so that the Last Hot Time will not come and the Gone Ones will not return. For this reason, too, there is much hatred of the Terrans among the People."

"Grandfather, if this were real there would be good reason for such hatred, and I would be ashamed for what my people had done and were doing. But it is not real." He had to rise and hold up his hands to quell the indignant outcry. "Have any of you known me to tell not-real things and try to make the People act as though they were real? Then trust me in this. I will show you real things, which you will all see, and I will give you great secrets, which it is now time for you to have and use for the good of the People. Even the greatest secret," he added.

There was a pause of a few seconds. Then they burst out, in a hundred and eighty-four—no, three hundred and sixty eight—voices:

"The Oomphel Secret, Mailsh Heelbare?"

He nodded slowly. "Yes. The Oomphel Secret will be given."

He leaned back and relaxed again while they were getting over the excitement. Foxx Travis looked at him apprehensively.

"Rushing things, aren't you? What are you going to tell them?"

"Oh, a big pack of lies, I suppose," Edith Shaw said scornfully.

Behind her and Travis, the native noncom interpreter was muttering something in his own language that translated roughly as: "This better be good!"

The shoonoon had quieted, now, and were waiting breathlessly.

"But if the Oomphel Secret is given, what will become of the shoonoon?" he asked. "You, yourselves, say that we Terrans have no need for magic, because the oomphel works magic for us. This is real. If the People get the Oomphel Secret, how much need will they have for you shoonoon?"

Evidently that hadn't occurred to them before. There was a brief flurry of whispered—whooshed, rather—conversation, and then they were silent again. The eldest shoonoo said:

"We trust you, Mailsh Heelbare. You will do what is best for the People, and you will not let us be thrown out like broken pots, either."

"No, I will not," he promised. "The Oomphel Secret will be given to you shoonoon." He thought for a moment of Foxx Travis' joking remark about the Kwannon Thaumaturgical Society. "You have been jealous of one another, each keeping his own secrets," he said. "This must be put away. You will all receive the Oomphel Secret equally, for the good of all the People. You must all swear brotherhood, one with another, and later if any other shoonoo comes to you for the secret, you must swear brotherhood with him and teach it to him. Do you agree to this?"

The eldest shoonoo rose to his feet, begged leave, and then led the others

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to the rear of the room, where they went into a huddle. They didn't stay huddled long; inside of ten minutes they came back and took their seats.

"We are agreed, Mailsh Heelbare," the spokesman said.

Edith Shaw was impressed, more than by anything else she had seen. "Well, that was a quick decision!" she whispered.

"You have done well, Grandfathers. You will not be thrown out by the People like broken pots; you will be greater among them than ever. I will show you how this will be.

"But first, I must speak around the Oomphel Secret." He groped briefly for a comprehensible analogy, and thought of a native vegetable, layered like an onion, with a hard kernel in the middle. "The Oomphel Secret is like a fooshkoot. There are many lesser secrets around it, each of which must be peeled off like the skins of a fooshkoot and eaten. Then you will find the nut in the middle."

"But the nut of the fooshkoot is bitter," somebody said.

He nodded, slowly and solemnly. "The nut of the fooshkoot is bitter," he agreed.

They looked at one another, disquieted by his words. Before anybody could comment, he was continuing:

"Before this secret is given, there are things to be learned. You would not understand it if I gave it to you now. You believe many not-real things which must be chased out of your minds, otherwise they would spoil your understanding."

That was verbatim what they told adolescents before giving them the Manhood Secret. Some of them huffed a little; most of them laughed. Then one called out: "Speak on, Grandfather of Grandfathers," and they all laughed. That was fine, it had been about time for teacher to crack his little joke. Now he became serious again.

"The first of these not-real things you must chase from your mind is this which you believe about the home of the Terrans. It is not real that they come from the Dark Place under the World. There is no Dark Place under the World."

Bedlam for a few seconds; that was a pretty stiff jolt. No Dark Place; who ever heard of such a thing? The eldest shoonoo rose, cradling his graven image in his arms, and the noise quieted.

"Mailsh Heelbare, if there is no Dark Place where do the Sky Fire and the Always-Same go when they are not in the sky?"

"They never leave the sky; the World is round, and there is sky everywhere around it."

They knew that, or had at least heard it, since the Terrans had come. They just couldn't believe it. It was against common sense. The oldest shoonoo said as much, and more:

"These young ones who have gone to the Terran schools have come to the villages with such tales, but who listens to them? They show disrespect for the chiefs and the elders, and even for the shoonoon. They mock at the Grandfather-stories. They say men should do women's work and

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women do no work at all. They break taboos, and cause trouble. They are fools."

"Am I a fool, Grandfather? Do I mock at the old stories, or show disrespect to elders and shoonoon? Yet I, Mailsh Heelbare, tell you this. The World is indeed round, and I will show you."

The shoonoo looked contemptuously at the globe. "I have seen those things," he said. "That is not the World; that is only a make-like. He held up his phalic wood-carving. "I could say that this is a make-like of the World, but that would not make it so."

"I will show you for real. We will all go in a ship." He looked at his watch. "The Sky Fire is about to set. We will follow it all around the world to the west, and come back here from the east, and the Sky Fire will still be setting when we return. If I show you that, will you believe me?"

"If you show us for real, and it is no a trick, we will have to believe you."

When they emerged from the escalators, Alpha was just touching the western horizon, and Beta was a little past zenith. The ship was moored on contragravity beside the landing stage, her gangplank run out. The shoonoon, who had gone up ahead, had all stopped short and were staring at her; then they began gabbling among themselves, overcome by the wonder of being about to board such a monster and ride on her. She was the biggest ship any of them had ever seen. Maybe a few of them had been on small freighters; many of them had never been off the ground. They didn't look or act like cynical charlatans or implacable enemies of progress and enlightenment. They were more like a lot of schoolboys whose teacher is taking them on a surprise outing.

"Bet this'll be the biggest day in their lives," Travis said.

"Oh, sure. This'll be a grandfather-story ten generations from now."

"I can't get over the way they made up their minds, down there," Edith Shaw was saying. "Why, they just went and talked for a few minutes and came back with a decision."

They hadn't any organization, or any place to maintain on an organizational pecking-order. Nobody was obliged to attack anybody else's proposition in order to keep up his own status. He thought of the Colonial Government taking ten years not to build those storm-shelters.

Foxx Travis was commenting on the ship, now:

"I never saw that ship before; didn't know there was anything like that on the planet. Why, you could lift a whole regiment, with supplies and equipment—"

"She's been laid up for the last five years, since the heat and the native troubles stopped the tourist business here. She's the old *Hesperus*. Excursion craft. This sun-chasing trip we're going to make used to be a must for tourists here."

"I thought she was something like that, with all the glassed observation deck forward. Who's the owner?"

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"Kwannon Air Transport, Ltd. I told them what I needed her for, and they made her available and furnished officers and crew and provisions for the trip. They were working to put her in commission while we were fitting up the fourth and fifth floors, downstairs."

"You just asked for that ship, and they just let you have it?" Edith Shaw was incredulous and shocked. They wouldn't have done that for the Government.

"They want to see these native troubles stopped, too. Bad for business. You know; selfish profit-move. That's another social force it's a good idea to work with instead of against."

The shoonoon were getting aboard, now, shepherded by the K.N.I. officer and a couple of his men and some of the ship's crew. A couple of sepoys were lugging the big globe that had been brought up from below after them. Everybody assembled on the forward top observation deck, and Miles called for attention and, finally, got it. He pointed out the three viewscreens mounted below the bridge, amidships. One on the left, was tuned to a pickup on the top of the Air Terminal tower, where the Terran city, the military reservation and the spaceport met. It showed the view to the west, with Alpha on the horizon. The one on the right, from the same point, gave a view in the opposite direction, to the east. The middle screen presented a magnified view of the navigational globe on the bridge.

Viewscreens were no novelty to the shoonoon. They were a very familiar type of oomphel. He didn't even need to do more than tell them that the little spot of light on the globe would show the position of the ship. When he was sure that they understood that they could see what was happening in Bluelake while they were away, he called the bridge and ordered Up Ship, telling the officer on duty to hold her at five thousand feet.

The ship rose slowly, turning toward the setting M-giant. Somebody called attention that the views in the screens weren't changing. Somebody else said:

"Of course not. What we see for real changes because the ship is moving. What we see in the screens is what the oomphel on the big building sees, and it does not move. That is for real as the oomphel sees it."

"Nice going," Edith said. "Your class has just discovered relativity." Travis was looking at the eastward viewscreen. He stepped over beside Miles and lowered his voice.

"Trouble over there to the east of town. Big swarm of combat contragravity working on something on the ground. And something's on fire, too."

"I see it."

"That's where those evacuees are camped. Why in blazes they had to bring them here to Bluelake—"

That had been EETA, too. When the solar tides had gotten high enough to flood the coastal area, the natives who had been evacuated from the district had deen brought here because the Native Education people wanted them exposed to urban influences.

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About half of the shoonoon who had been rounded up locally had come in from the tide-innundated area.

"Parked right in the middle of the Terran-type food production area," Travis was continuing.

That was worrying him. Maybe he wasn't used to planets where the biochemistry wasn't Terra-type and a Terran would be poisoned or, at best, starve to death, on the local food; maybe, as a soldier he knew how fragile even the best logistics system can be. It was something to worry about. Travis excused himself and went off in the direction of the bridge. Going to call HQ and find out what was happening.

Excitement among the shoonoon; they had spotted the ship on which they were riding in the westward screen. They watched it until it had vanished from "sight of the seeing-oomphel," and by then were over the upland forests from whence they had been brought to Bluelake. Now and then one of them would identify his own village, and that would start more excitement.

Three infantry troop-carriers and a squadron of air cavalry were rushing past the eastward pickup in the right hand screen; another fire had started in the trouble area.

The crowd that had gathered around the globe that had been brought aboard began calling for Mailsh Heelbare to show them how they would go around the world and what countries they would pass over. Edith accompanied him and listened while he talked to them. She was bubbling with happy excitement, now. It had just dawned on her that shoonoon were fun.

None of them had ever seen the mountains along the western side of the continent except from a great distance. Now they were passing over them; the ship had to gain altitude and even then make a detour around one snow-capped peak. The whole hundred and eighty-four rushed to the starboard side to watch it as they passed. The ocean, half an hour later, started a rush forward. The score or so of them from the Tidewater knew what an ocean was, but none of them had known that there was another one to the west. Miles' view of the education program of the EETA, never bright at best, became even dimmer. *The young men who have gone to the Terran schools . . . who listens to them? They are fools.*

There were a few islands off the coast; the shoonoon identified them on the screen globe, and on the one on deck. Some of them wanted to know why there wasn't a spot of light on this globe, too. It didn't have the oomphel inside to do that; that was a satisfactory explanation. Edith started to explain about the orbital beacon-stations ox-planet and the radio beams, and then stopped.

"I'm sorry; I'm not supposed to say anything to them," she apologized.

"Oh, that's all right. I wouldn't go into all that, though. We don't want to overload them."

She asked permission, a little later, to explain why the triangle tip of the

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arctic continent, which had begun to edge into sight on the screen globe, couldn't be seen from the ship. When he told her to go ahead, she got a platinum half-sol piece from her purse, held it on the globe from the classroom and explained about the curvature and told them they could see nothing farther away than the circle the coin covered. It was beginning

and Edith went to the officers' dining room back of the bridge. Edith, by now, was even more excited than the shoonoon.

"They're so anxious to learn!" She was having trouble adjusting to that; that was dead against EETA doctrine. "But why wouldn't they listen to the teachers we sent to the villages?"

"You heard old Shatresh—the fel-

to look as though the psychological-warfare experiment might show another, unexpected, success.

There was nothing, after the islands passed, but a lot of empty water. The shoonoon were getting hungry, but they refused to go below to eat. They were afraid they might miss something. So their dinner was brought up on deck for them. Miles and Travis

low with the pornographic sculpture and the yellow robe. These young twerps act like fools, and sensible people don't pay any attention to fools. What's more, they've been sent out indoctrinated with the idea that shoonoon are a lot of lying old fakes, and the shoonoon resent that. You know, they're not lying old fakes. Within their limitations, they are

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honest and ethical professional people."

"Oh, come, now! I know, I think they're sort of wonderful, but let's don't give them too much credit."

"I'm not. You're doing that."

"Huh?" She looked at him in amazement. "Me?"

"Yes, you. You know better than to believe in magic, so you expect them to know better, too. Well, they don't. You know that under the macroscopic world-of-the senses there exists a complex of biological, chemical and physical phenomena down to the subnucleonic level. They realize that there must be something beyond what they can see and handle, but they think it's magic. Well, as a race, so did we until only a few centuries pre-atomic. These people are still lower Neolithic, a hunting people who have just learned agriculture. Where we were twenty thousand years ago.

"You think any glib-talking Kwann can hang a lot of rags, bones and old iron onto himself, go through some impromptu mummery, and set up as shoonoo? Well, he can't. The shoonoon are a hereditary caste. A shoonoo father will begin teaching his son as soon as he can walk and talk, and he keeps on teaching him till he's the age-equivalent of a graduate M.D. or a science Ph. D."

"Well, what all is there to learn —?"

"The theoretical basis and practical applications of sympathetic magic. Action-at-a-distance by one object upon another. Homeopathic magic: the principle that things which resemble one another will interact. For instance, there's an animal the natives call a shynph. It has an excrescence of horn on its brow like an arrowhead, and it arches its back like a bow when it jumps. Therefore, a shynph is equal to a bow and arrow, and for that reason the Kwanns made their bowstrings out of shynph-gut. Now they use tensilon because it won't break as easily or get wet and stretch. So they have to turn the tensilon into shynph-gut. They used to do that by drawing a picture of a shynph on the spool, and then the traders began labeling the spools with pictures of shynph. I think my father was one of the first to do that.

"Then, there's contagious magic. Anything that's been part of anything else or come in contact with it will interact permanently with it. I wish I had a sol for every time I've seen a Kwann pull the wad out of a shot-shell, pick up a pinch of dirt from the footprint of some animal he's tracking, put it in among the buckshot, and then crimp the wad in again.

"Everything a Kwann does has some sort of magical implications. It's the shoonoo's business to know all this; to be able to tell just what magical influences have to be produced, and what influences must be avoided. And there are circumstances in which magic simply will not work, even in theory. The reason is that there is some powerful counter-influence at work. He has to know when he can't

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use magic, and he has to be able to explain why. And when he's theoretically able to do something by magic, he has to have a plausible explanation why it won't produce results—just as any highly civilized and ethical Terran M.D. has to be able to explain his failures to the satisfaction of his late patient's relatives. Only a shoonoo doesn't get sued for malpractice; he gets a spear stuck in him. Under those circumstances, a caste of hereditary magicians is literally bred for quick thinking. These old gaffers we have aboard are the intellectual top crust among the natives. Any of them can think rings around your Government school products. As for preying on the ignorance and credulity of the other natives, they're only infinitesmally less ignorant and credulous themselves. But they want to learn —from anybody who can gain their respect by respecting them."

Edith Shaw didn't say anything in reply. She was thoughtful during the rest of the meal, and when they were back on the observation deck he noticed that she seemed to be looking at the shoonoon with new eyes.

In the screen-views of Bluelake, Beta had already set, and the sky was fading; stars had begun to twinkle. There were more fires—one, close to the city in the east, a regular conflagration—and fighting had broken out in the native city itself. He was wishing now, that he hadn't thought it necessary to use those screens. The shoonoon were noticing what was going on in them, and talking among themselves. Travis, after one look at the situation, hurried back to the bridge to make a screen-call. After a while, he returned, almost crackling with suppressed excitement.

"Well, it's finally happened! Maith's forced Kovac to declare martial rule!" he said in an exultant undertone.

"Forced him?" Edith was puzzled. "The Army can't force the Civil Government—"

"He threatened to do it himself. Intervene and suspend civil rule."

"But I thought only the Navy could do that."

"Any planetary commander of Armed Forces can, in a state of extreme emergency. I think you'll both agree that this emergency is about as extreme as they come. Kovac knew that Maith was unwilling to do it—he'd have to stand court-martial to justify his action—but he also knew that a governor general who has his Colony taken away from him by the Armed Forces never gets it back; he's finished. So it was just a case of the weaker man in the weaker position yielding."

"Where does this put us?"

"We are a civilian scientific project. You are under orders of General Maith. I am under your orders. I don't know about Edith."

"Can I draft her, or do I have to get you to get General Maith to do it?"

"Listen, don't do that," Edith protested. "I still have to work for Government House, and this martial rule won't last forever. They'll all be prejudiced against me—"

"You can shove your Government

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job on the air lock," Miles told her. "You'll have a better one with Planetwide News, at half again as much pay. And after the shakeup at Government House, about a year from now, you may be going back as director of EETA. When they find out on Terra just how badly this Government has been mismanaging things there'll be a lot of vacancies."

The shoonoon had been watching the fighting in the viewscreens. Then somebody noticed that the spot of light on the navigational globe was approaching a coastline, and they all rushed forward for a look.

Travis and Edith slept for a while; when they returned to relieve him, Alpha was rising to the east of Bluelake, and the fighting in the city was still going on. The shoonoon were still wakeful and interested; Kwanns could go without sleep for much longer periods than Terrans. The lack of any fixed cycle of daylight and darkness on their planet had left them unconditioned to any regular sleeping-and-waking rhythm.

"I just called in," Travis said. "Things aren't good, at all. Most of the natives in the evacuee cantonments have gotten into the native city, now, and they've gotten hold of a lot of firearms somehow. And they're getting nasty in the west, beyond where Gonzales is occupying, and in the northeast, and we only have about half enough troops to cope with everything. The general wants to know how you're making out with the shoonoon."

"I'll call him before I get in the sack."

He went up on the bridge and made the call. General Maith looked as sleepy as he felt; they both yawned as they greeted each other. There wasn't much he could tell the general, and it sounded like the glib reassurances one gets from a hospital about a friend's condition.

"We'll check in with you as soon as we get back and get our shoonoon put away. We understand what's motivating these frenzies, now, and in about twenty-five to thirty hours we'll be able to start doing something about it.

The general, in the screen, grimaced.

"That's a long time, Mr. Gilbert. Longer than we can afford to take, I'm afraid. You're not cruising at full speed now, are you?"

"Oh, no, general. We're just trying to keep Alpha level on the horizon." He thought for a moment. "We don't need to keep down to that. It may make an even bigger impression if we speed up."

He went back to the observation deck, picked up the PA-phone, and called for attention.

"You have seen, now, that we can travel around the world, so fast that we keep up with the Sky Fire and it is not seen to set. Now we will travel even faster, and I will show you a new wonder. I will show you the Sky Fire rising in the west; it and the Always-Same will seem to go backward in the sky. This will not be for real; it will only be seen so because we will be

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traveling faster. Watch, now, and see." He called the bridge for full speed, and then told them to look at the Sky-Fire and then see in the screens where it stood over Bluelake.

That was even better; now they were racing with the Sky-Fire and catching up to it. After half an hour he left them still excited and whooping gleefully over the steady gain. Five hours later, when he came back after a nap and a hasty breakfast, they were still whooping. Edith Shaw was excited, too; the shoonoon were trying to estimate how soon they would be back to Bluelake by comparing the position of the Sky Fire with its position in the screen.

General Maith received them in his private office at Army HQ; Foxx Travis mixed drinks for the four of them while the general checked the microphones to make sure they had privacy.

"I blame myself for not having forced martial rule on them hundreds of hours ago," he said. "I have three brigades; the one General Gonzales had here originally, and the two I brought with me when I took over here. We have to keep at least half a brigade in the south, to keep the tribes there from starting any more forest fires. I can't hold Bluelake with anything less than half a brigade. Gonzales has his hands full in his area. He had a nasty business while you were off on that world cruise—natives in one village caught the men stationed there off guard and wiped them out, and then started another frenzy. It spread to two other villages before he got it stopped. And we need the Third Brigade in the northeast; there are three quarters of a million natives up there, inhabiting close to a million square miles. And if anything really breaks loose here, and what's been going on in the last few days is nothing even approaching what a real outbreak could be like, we'll have to pull in troops from everywhere. We must save the Terran-type crops and the carniculture plants. If we don't, we all starve."

Miles nodded. There wasn't anything he could think of saying to that.

"How soon can you begin to show results with those shoonoon, Mr. Gilbert?" the general asked. "You said from twenty-five to thirty hours. Can you cut that any? In twenty-five hours, all hell could be loose all over the continent."

Miles shook his head. "So far, I haven't accomplished anything positive," he said. "All I did with this trip around the world was convince them that I was telling the truth when I told them there was no Dark Place under the World, where Alpha and Beta go at night." He hastened, as the general began swearing, to add: "I know, that doesn't sound like much. But it was necessary. I have to convince them that there will be no Last Hot Time, and then—"

The shoonoon, on their drum-shaped cushions, stared at him in silence, aghast. All the happiness over the wonderful trip in the ship, when they had chased the Sky Fire around

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the World and caught it over Bluelake, and even their pleasure in the frozen delicacies they had just eaten, was gone.

"No—Last—Hot—Time?"

"Mailsh Heelbare, this is not real! It cannot be"

"The Gone Ones—"

"The Always-Cool Time, when there will be no more hunger or hard work or death; it cannot be real that this will never come!"

He rose, holding up his hands; his action stopped the clamor.

"Why should the Gone Ones want to return to this poor world that they have gladly left?" he asked. "Have they not a better place in the middle of the Sky Fire, where it is always cool? And why should you want them to come back to this world? Will not each one of you pass, sooner or later, to the middle of the Sky Fire; will you not there be given new bodies and join the Gone Ones? There is the Always-Cool; there the crops grow without planting and without the work of women; there the game come into the villages to be killed in the gathering-places, without hunting. There you will talk with the other Gone Ones, your fathers and your fathers' fathers, as I talk with you. Why do you think this must come to the World of People? Can you not wait to join the Gone Ones in the Sky Fire?"

Then he sat down and folded his arms. They were looking at him in amazement; evidently they all saw the logic, but none of them had ever thought of it before. Now they would have to turn it over in their minds and accustom themselves to the new viewpoint. They began whooshing among themselves. At length, old Shatresh, who had seen the Hot Time before, spoke:

"Mailsh Heelbare, we trust you," he said. "You have told us of wonders, and you have shown us that they were real. But do you know this for real?"

"Do you tell me that you do not?" he demanded in surprise. "You have had fathers, and fathers' fathers. They have gone to join the Gone Ones. Why should you not, also? And why should the Gone Ones come back and destroy the World of People? Then your children will have no more children, and your children's children will never be. It is in the World of People that the People are born; it is in the World that they grow and gain wisdom to fit themselves to live in the Place of the Gone Ones when they are through with the bodies they use in the World. You should be happy that there will be no Last Hot Time, and that the line of your begettings will go on and not be cut short."

There were murmurs of agreement with this. Most of them were beginning to be relieved that there wouldn't be a Last Hot Time, after all. Then one of the class asked:

"Do the Terrans also go to the Place of the Gone Ones, or have they a place of their own?"

He was silent for a long time, looking down at the floor. Then he raised his head.

"I had hoped that I would not have

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to speak of this," he said. "But, since you have asked, it is right that I should tell you." He hesitated again, until the Kwanns in front of him had begun to fidget. Then he asked old Shatresh: "Speak of the beliefs of the People about how the World was made."

"The great Spirit made the world." He held up his carven obscenity. "He made the World out of himself. This is a makelike to show it."

"The Great Spirit made many worlds. The stars which you see in dark-time are all worlds, each with many smaller worlds around it. The Great Spirit made them all at one time, and made people on many of them. The Great Spirit made the World of People, and made the Always-Same and the Sky Fire, and inside the Sky Fire he made the Place of the Gone Ones. And when he made the Place of the Gone Ones, he put an Oomphel-Mother inside it, to bring forth oomphel."

This created a brief sensation. An Oomphel-Mother was something they had never thought of before, but now they were wondering why they hadn't. Of course there'd be an Oomphel-Mother; how else would there be oomphel?

"The World of the Terrans is far away from the World of People, as we have always told you. When the Great Spirit made it He gave it only an Always-Same, and no Sky Fire. Since there was no Sky Fire, there was no place to put a Place of the Gone Ones, so the Great Spirit made the Terrans so that they would not die, but live forever in their own bodies. The Oomphel-Mother for the World of the Terrans the Great Spirit hid in a cave under a great mountain.

"The Terrans whom the Great Spirit made lived for a long time, and then, one day, a man and a woman found a crack in a rock, and went inside, and they found the cave of the Oomphel-Mother, and the Oomphel-Mother in it. So they called all the other Terrans, and they brought the Oomphel-Mother out, and the Oomphel-Mother began to bring forth Oomphel. The Oomphel-Mother brought forth metal, and cloth, and glass, and plastic; knives, and axes and guns and clothing—" He went on, cataloguing the products of human technology, the shoonoon staring more and more wide-eyed at him. "And oomphel to make oomphel, and oomphel to teach wisdom," he finished. "They became very wise and very rich.

"Then the Great Spirit saw what the Terrans had done, and became angry, for it was not meant for the Terrans to do this, and the Great Spirit cursed the Terrans with a curse of death. It was not death as you know it. Because the Terrans had sinned by laying hands on the Oomphel-Mother, not only their bodies must die, but their spirits also. A Terran has a short life in the body, after that no life."

"This, then, is the Oomphel Secret. The last skin of the fooshkoot has been peeled away; behold the bitter nut, upon which we Terrans have chewed for more time than anybody can count. Happy people! When you

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die or are slain, you go to the Place of the Gone Ones, to join your fathers and your fathers' fathers and to await your children and children's children. When we die or are slain, that is the end of us."

"But you have brought your oomphel into this world; have you not brought the curse with it?" somebody asked, frightened.

"No. The People did not sin against the Great Spirit; they have not laid hands on an Oomphel-Mother as we did. The oomphel we bring you will do no harm; do you think we would be so wicked as to bring the curse upon you? It will be good for you to learn about oomphel here; in your Place of the Gone Ones there is much oomphel."

"Why did your people come to this world, Mailsh Heelbare?" old Shatresh asked. "Was it to try to hide from the curse?"

"There is no hiding from the curse of the Great Spirit, but we Terrans are not a people who submit without strife to any fate. From the time of the Curse of Death on, we have been trying to make spirits for ourselves."

"But how can you do that?"

"We do not know. The oomphel will not teach us that, though it teaches everything else. We have only learned many ways in which it cannot be done. It cannot be done with oomphel, or with anything that is in our own world. But the Oomphel-Mother made us ships to go to other worlds, and we have gone to

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many of them, this one among them, seeking things from which we try to make spirits. We are trying to make spirits for ourselves from the crystals that grow in the klooba plants; we may fail with them, too. But I say this; I may die, and all the other Terrans now living may die, and be as though they had never been, but someday we will not fail. Someday our children, or our children's children, will make spirits for themselves and live forever, as you do."

"Why were we not told this before, Mailsh Heelbare?"

"We were ashamed to have you know it. We are ashamed to be people without spirits."

"Can we help you and your people? Maybe our magic might help."

"It well might. It would be worth trying. But first, you must help yourselves. You and your people are sinning against the Great Spirit as grievously as did the Terrans of old. Be warned in time, lest you answer it as grievously."

"What do you mean, Mailsh Heelbare?" Old Shatresh was frightened.

"You are making magic to bring the Sky Fire to the World. Do you know what will happen? The World of People will pass whole into the place of the Gone Ones, and both will be destroyed. The World of People is a world of death; everything that lives on it must die. The Place of the Gone Ones is a world of life; everything in it lives forever. The two will strive against each other, and will destroy one another, and there will be nothing in the Sky Fire or the World but fire. This is wisdom which our oomphel teaches us. We know this secret, and with it we make weapons of great destruction." He looked over the seated shoonoon, picking out those who wore the flame-colored cloaks of the fire-dance. "You —and you—and you," he said. "You have been making this dreadful magic, and leading your people in it. And which among the rest of you have not been guilty?"

"We did not know," one of them said. "Mailsh Heelbare, have we yet time to keep this from happening?"

"Yes. There is only a little time, but there is time. You have until the Always-Same passes across the face of the Sky-Fire." That would be seven hundred and fifty hours. "If this hap-

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pens, all is safe. If the Sky Fire blots out the Always Same, we are all lost together. You must go among your people and tell them what madness they are doing, and command them to stop. You must command them to lay down their arms and cease fighting. And you must tell them of the awful curse that was put upon the Terrans in the long-ago time, for a lesser sin than they are now committing."

"If we say that Mailsh Heelbare told us this, the people may not believe us. He is not known to all, and some would take no Terran's word, not even his."

"Would anybody tell a secret of this sort, about his own people, if it were not real?"

"We had better say nothing about Mailsh Heelbare. We will say that the Gone Ones told us in dreams."

"Let us say that the Great Spirit sent a dream of warning to each of us," another shoonoo said. "There has been too much talk about dreams from the Gone Ones already."

"But the Great Spirit has never sent a dream—"

"Nothing like this has ever happened before, either."

He rose, and they were silent. "Go to your living-place, now," he told them. "Talk of how best you may warn your people." He pointed to the clock. "You have an oomphel like that in your living-place; when the shorter spear has moved three places, I will speak with you again, and then you will be sent in air cars to your people to speak to them."

They went up the escalator and down the hall to Miles' office on the third floor without talking. Foxx Travis was singing softly, almost inaudibly:

"You will eeeeat . . . in the sweeeet . . . bye-and-bye,
You'll get oooom . . . phel in the sky . . . when you die!"

Inside, Edith Shaw slumped dispiritedly in a chair. Foxx Travis went to the coffee-maker and started it. Miles snapped on the communication screen and punched the combination of General Maith's headquarters. As soon as the uniformed girl who appeared in it saw him, her hands moved quickly; the screen flickered, and the general appeared in it.

"We have it made, general. They're sold; we're ready to start them out in three hours."

Maith's thin, weary face suddenly lighted. "You mean they are going to co-operate?"

He shook his head. "They think they're saving the world; they think we're co-operating with them."

The general laughed. "That's even better! How do you want them sent out?"

"The ones in the Bluelake area first. Better have some picked K.N.I. in native costume, with pistols, to go with them. They'll need protection, till they're able to get a hearing for themselves. After they're all out, the ones from Gonzales' area can be started." He thought for a moment. "I'll want four or five of them left here to help me when you start bringing more shoonoon in from other

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areas. How soon do you think you'll have another class for me?"

"Two or three days, if everything goes all right. We have the villages and plantations in the south under pretty tight control now; we can start gathering them up right away. As soon as we get things stabilized here, we can send reinforcements to the north. We'll have transport for you in three hours."

The general blanked out. He turned from the screen. Travis was laughing happily.

"Miles, did anybody ever tell you you were a genius?" he asked. "That last jolt you gave them was perfect. Why didn't you tell us about it in advance?"

"I didn't know about it in advance; I didn't think of it till I'd started talking to them. No cream or sugar for me."

"Cream," Edith said, lifelessly. "Why did you do it? Why didn't you just tell them the truth?"

Travis asked her to define the term. She started to say something bitter about Jesting Pilate. Miles interrupted.

"In spite of Lord Beacon, Pilate wasn't jesting," he said. "And he didn't stay for an answer because he knew he'd die of old age waiting for one. What kind of truth should I have told them?"

"Why, what you started to tell them. That Beta moves in a fixed orbit and can't get any closer to Alpha—"

"There's been some work done on the question since Pilate's time," Travis said. "My semantics prof at Command College had the start of an answer. He defined truth as a statement having a practical correspondence with reality on the physical levels of structure and observation and the verbal order of abstraction under consideration."

"He defined truth as a statement. A statement exists only in the mind of the person making it, and the mind of the person to whom it is made. If the person to whom it is made can't understand or accept it, it isn't the truth."

"They understood when you showed them that the planet is round, and they understood that tri-dimensional model of the system. Why didn't you let it go at that?"

"They accepted it intellectually. But when I told them that there wasn't any chance of Kwannon getting any closer to Alpha, they rebelled emotionally. It doesn't matter how conclusively you prove anything, if the person to whom you prove it can't accept your proof emotionally, it's still false. Not-real."

"They had all their emotional capital invested in this Always-Cool Time," Travis told her. "They couldn't let Miles wipe that out for them. So he shifted it from this world to the next, and convinced them that they were getting a better deal that way. You saw how quickly they picked it up. And he didn't have the sin of telling children there is no Easter Bunny on his conscience, either."

"But why did you tell them that

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story about the Oomphel Mother?" she insisted. "Now they'll go out and tell all the other natives, and they'll believe it."

"Would they have believed it if I'd told them about Terran scientific technology? Your people have been doing that for close to half a century. You see what impression it's made."

"But you told them— You told them that Terrans have no souls!"

"Can you prove that was a lie?" Travis asked. "Let's see yours. Draw —*soul!* Inspection—*soul!*"

Naturally, Foxx Travis would expect a soul to be carried in a holster.

"But they'll look down on us, now. They'll say we're just like animals," Edith almost wailed.

"Now it comes out," Travis said. "We won't be the lordly Terrans, any more; helping the poor benighted Kwanns out of the goodness of our hearts, scattering largess, bearing the Terran's Burden—new model, a give-away instead of a gun. Now *they'll* pity *us*; they'll think *we're* inferior beings."

"I don't think the natives are inferior beings!" She was almost in tears.

"If you don't, why did you come all the way to Kwannon to try to make them more like Terrans?"

"Knock it off, Foxx; stop heckling her." Travis looked faintly surprised. Maybe he hadn't realized, before, that a boss newsman learns to talk like a commanding officer. "You remember what Ramón Gonzales was saying, out at Sanders', about the inferior's hatred for the superior as superior? It's no wonder these Kwanns resent us. They have a right to; we've done them all an unforgivable injury. We've let them see us doing things they can't do. Of course they resent us. But now I've given them something to feel superior about. When they die, they'll go to the Place of the Gone Ones, and have oomphel in the sky, and they will live forever in new bodies, but when we die, we just die, period. So they'll pity us and politely try to hide their condescension toward us.

"And because they feel superior to us, they'll want to help us. They'll work hard on the plantations, so that we can have plenty of biocrystals, and their shoonoon will work magic for us, to help us poor benighted Terrans to grow souls for ourselves, so that we can almost be like them. Of course, they'll have a chance to exploit us, and get oomphel from us, too, but the important thing will be to help the poor Terrans. Maybe they'll even organize a Spiritual and Magical Assistance Agency."

THE END

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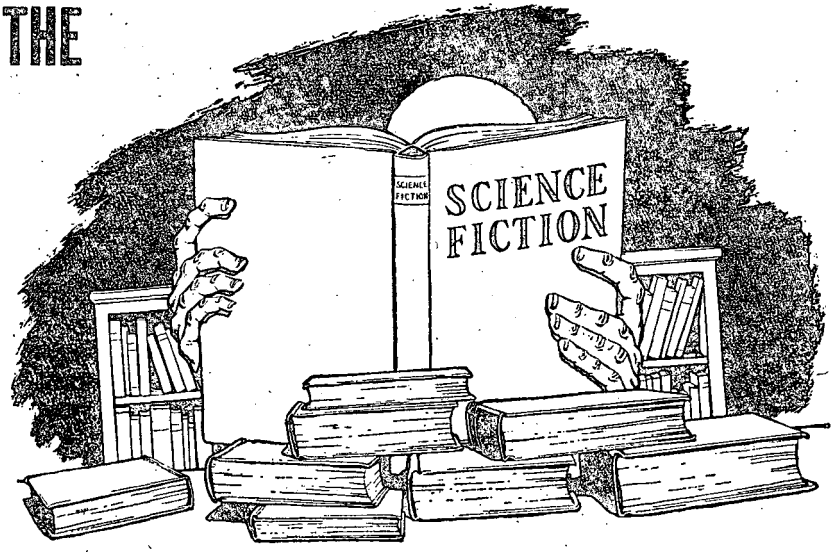
THE



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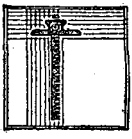
By P. SCHUYLER MILLER

THREE ROADS TO HELL



HEN Kingsley Amis called his survey of science fiction "New Maps of Hell," he was emphasizing the way in which we have pointed to the dangers and rotten spots in many of the shining treasures of our society. Among others, science fiction has consistently spelled out the horrors of nuclear war. Now the success of "On the Beach" seems to have impelled a number of general publishers to make a valiant attempt to get on what just may be a bandwagon—buying books that they would never have considered in "normal" times, and perhaps egging writers on to produce their own variations on the theme.

I have commented on several such books in the last few months, and three more are on the table now.

"The Last Day," by "Helen Clarkson"—Torquil Books; 1959; 183 pp.; $3.50—is what is generally called a "woman's book," written by an established author of such books who is

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apparently hiding behind a pseudonym for fear of alienating her usual followers. I think she'd have done better to keep them, and her own name, and shake them a little. It would have guaranteed a foundation of sales that the book won't get now.

More could be said for "The Last Day" if Judith Merril hadn't done the job so much better, so much more calmly and truthfully, so long ago in "Shadow on the Hearth." Certainly a woman's view of atomic war and its aftermath is a legitimate and important theme. Unfortunately, in "The Last Day" it is handled like soap opera—whether because this is the author's regular medium, or because she believes it calls for this treatment, I have no way of knowing.

Some time in the very near future a nice suburban couple, Lois and Bill, are on their way to vacation on an island off the Massachusetts coast, after seeing their daughter off on a jet for Paris. The car radio doesn't work, so they don't know that the world is collapsing until late that evening, after they have become more concerned with the blowsy sadist who has moved in on one side of their cottage with a pitiable little girl, and the ex-AEC physicist with a fellow-traveling wife who has appeared on the other. That night the nuclear war begins, and for the next seven days we watch the island community make a futile effort to cope with preparations for fallout, ignore practically everything it had decided to do, and die horribly and cravenly or heroically, as the mood demands.

Granted that there is little that a summer community could do to protect itself, the whole book has an air of spur-of-the-moment unreality about it, which is exactly what it should not have. An atomic miracle is called forth to put all transistors out of commission—except a distant supply that a heroic scientist must go for at the sacrifice of his own life. Although our central characters are running around in the open pretty freely, nothing happens to them until the bitter end, while the community's children, who should certainly have been given the greatest protection, drop like flies to build up the pathos. Death by radiation is handled, aside from the textbook symptoms, just like the mysterious oriental plagues that have been striking down the loved-ones of sudsy heroines since the early days of radio—except that we know, don't we, that the old country doctor won't go out into his summer-kitchen laboratory and discover a wonder drug to cure it.

"When the Kissing Had to Stop," by Constantine Fitz Gibbon—W. W. Norton & Co.; 1960; 248 pp.; $3.95—is quite another kettle of fish. The author is known for five novels and several other serious books, and his professional hand shows clearly in this story of the smooth inevitability with which—in 1964 or '65—Russia takes over England. This can well be the process that we are watching in Cuba now, with the technique changed a little for the different circumstances.

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We watch the take-over with someone almost on the sidelines, an advertising executive and Irish earl, Patrick, Earl of Clonard, whose actress mistress has become drawn into the circle of an opportunistic politician. This man, Rupert Page-Gorman, has used Communist backing to build up an anti-American wave of public opinion that will get American rocket bases and H-bombs out of England, his own party into power, and himself in the Prime Minister's chair. A Russian inspection team will be invited in to see that the Americans have left; their presence will lend plausibility to his assumption of emergency powers; and the result will be a dictatorship of Page-Gorman. But the Russians are more skilled at these things than he supposes, and more deeply entrenched in his own organization. And a small group, including Patrick Clonard, gets wind of his plans and sets out to stop him.

What we have is a picture of a decaying society, strangled in its own forms and formalities, become too stiff to move quickly when it must—even though the "heart of oak" still beats in the English people. England, it has been said, loses every battle except the last one. Next time, Mr. Fitz Gibbon is saying, there will be no last battle.

The most serious, most ambitious of the three books is "Level 7," by Mordecai Roshwald, a Polish expatriate now teaching at the University of Minnesota. McGraw-Hill publishes it in a 186-page volume for $3.75, and its dedication is "To Dwight and Nikita." Nowhere is the scene of the book identified; it may as well be Nikita's country as Dwight's, and because of the strong European flavor of the writing, it may even be more logical that Level 7 is buried forty-four hundred feet under Moscow.

This is a book in the tradition of Zamiatin's "We" and Orwell's "1984." It is to be filmed in England from a script by J. P. Priestley, and has the plaudits of Betrand Russell, Mr. Priestley, and Linus Pauling on its jacket. This, then, far more than "On the Beach" or Pat Frank's "Alas, Babylon," or the two books I have just described, will be the intellectuals' novel of warning.

Level 7 is the deepest of the self-sustaining subterranean shelters in which an unnamed nation inters itself as the danger of nuclear war grows. It is the level of nuclear attack, where four men sit at keyboards, ready to launch swarms of intercontinental rockets against the enemy, who has a similar team in his own cave-world. There are five hundred people in Level 7, and they have been sealed in with supplies to last themselves and their children for five hundred years. Above them, at three thousand feet from the surface, is Level 6, where the antimissile defense teams are buried. These two are the military levels.

In Level 5 the elite of the country —twenty thousand of them, in four scattered centers—can hide for two hundred years, at a depth of fifteen hundred feet. At one thousand feet

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is Level 4, which will support a hundred thousand less influential people for a century. Next in the social hierarchy are the half million people in the twenty-five units of Level 3, with supplies for twenty-five years. Finally, the general populace is to be sheltered just under the surface, with food for only a month or two. They are expendable; if the need for shelter comes, nobody will be able to venture out on the surface for years. In fact, only the military and the politicians are really safe.

Our hero, X-127, tells the story of Level 7 through a diary that presumably survives him. We follow him as he acclimates to the rigid routine of underground life, as he learns about the other levels, as he struggles consciously and unconsciously with his role in life. We are shown the process by which he and his fellows—psychologically screened in the first place—are conditioned to become the troglodyte race that will survive Armageddon. And Armageddon comes, with less than three hours of total war that destroys the Earth, followed by the gradual decimation of the levels.

The author is not a scientist, and he has shown us an academic hell—*Saturday Review* variety—planned and executed on paper by bureaucrats, with little chance that it would ever work. That even Level 7, nearly a mile deep, should rely on surface water instead of recycling its moisture in a closed system . . . that its reactor should not be adequately shielded . . . that quarters meant to last for five hundred years should be so cramped . . . these seem implausible to us, and are probably immaterial to the author, who wants only to show us the horrors of the regimented society that can plan in this way, and of the made-over, brainwashed people who can live in it contentedly, calling each other by numbers instead of names. A humanist, he is concerned only with the human aspects of Level 7; the rest is stage-setting, not too well handled. The disaster of our society is that men and women can be treated in this way, as impersonal, expendable statistics—and that it is becoming more and more plausible to us that they will be and must be.

Even if Level 7 is under Moscow or Peiping or Warsaw or Berlin, there is another Level 7 in that enemy nation across the world, from which, at last, come the twelve perhaps accidentally launched H-bombs that trigger the holocaust. It does not matter in the least which is which—and this is a legitimate reason for introducing the people of the book only as numbers. It s about us, as it is about them, for in the face of inevitable doom we become more and more alike until there is no difference.

Incidentally, Ace has now brought out a paperback edition of Hans Hellmut Kirst's "The Seventh Day," a gifted German novelist's vision of the week before the world ends and the inevitability with which destruction comes. It is complete: three hundred eighty-three pages for fifty cents; Ace Star Book No. K-110.

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This mosaic of the interwoven lives of people from different niches in West German society, as war comes, is less literarily pretentious and "universal" than "Level 1" and has a less unified plot than "When the Kissing Had to Stop," but it is the best of the three—more realistic, more believable, more immediate.

As many a reader pointed out immediately, my attempt to translate the original German title of "The Seventh Day" with memories of Freshman German that was no good thirty years ago was a distinct flop. In essence, it should have been "Nobody Survives," and it would do as well for Roshwald's and Miss Clarkson's books.

THE LITTLE MEN, by Joseph E. Kelleam. Avalon Books, New York. 1960. 226 pp. $2.95

After hitting the high of Casewit's "Peacemakers," Avalon dives into the depths of a corny underworld with this reprint from *Amazing*, where it was called "Hunters Out of Time" and launched a series of adventures of Dr. Jack Odin.

The book would have been old-fashioned a generation ago. A beautiful girl, a trio of faithful dwarves, and a villainous princeling from a lost world deep in the Earth come to the surface. Our hero is drawn into their plotting, goes to their world, and solves pretty nearly all their problems. Merritt and many another did it well; Kelleam doesn't.

I have some niggling, specific gripes. It's a Nordic supremacy story, though this time the Nordics are gnomes. Neither they nor anybody else, bred on Earth or introduced here, was raising cattle and growing grain—let alone in Scandinavia—twenty-five thousand years ago. This was some ten thousand years before the cave men were painting mammoths and woolly rhinoceri on the walls of Lascaux Cave. Murray Leinster made this same mistake recently. The stars of twenty-five thousand years ago, reproduced on the roof of the underground world, would certainly not be the same as those of today. And a photograph of the inner solar system, taken with Pluto in the foreground, would not show the inner planets as disks: even the Sun would be a star, as other writers have pointed out quite effectively.

THE OTHER SIDE OF THE MOON, translated by J. B. Sykes. Pergamon Press, New York. 1960. 36 pp. $2.50

This is the English translation of a booklet published by the U.S.S.R. Academy of Sciences.

You may have to look for the book in the children's section of your book store—where most science fiction is put anyway. The publisher has seen fit to put it out in a picture-book format, though in content it is far from that. You will also be disappointed if you expect more and better pictures of the other side of the Moon. There

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are only three, and their quality is no better than those we have seen in *Life* and elsewhere. The report says "numerous" photographs were taken, though it does not say how many were good. There may be discussion of what they show, in the scientific report now in preparation.

What the book does show is that the picture-taking operation was a thoroughly sophisticated one, and not a boom-and-blunder procedure as some discounters of Russian rocket science would like to make it. The satellite's orbit was rather like that classic science fictive flight to the outer planets that "jumps over" the asteroid belt. It was also rather like the course taken by a trout fly or bass plug that is cast under a rock from across the stream. The rocket left the Earth in a polar orbit, heading north, then curved down and under the Moon's orbit, passing over the South Polar region at a distance of about thirty-eight hundred miles from the surface. The Moon's gravitational attraction now swung it around into a new, more or less elliptical orbit that carried it far out into space and back around the Earth—the orbit it is now following.

The satellite did not photograph the Moon at its closest approach, because the part of the Moon's surface below it was dark at the time, because a more distant shot would show more, and because of the nature of the triggering mechanism that started the forty minutes of automatic picture-taking. When three bright objects—the Moon, the Sun, and the Earth—were "seen" by the control mechanism in the proper positions, the orientation system first stopped the satellite's random rotation, then lined it up with the Sun directly behind it, the Moon's fully illuminated surface directly in front of its cameras, and the Earth off to one side. The mechanism also kept the cameras pointed at the Moon during the forty minutes that picture-taking continued. I would guess that the satellite could not carry enough fuel to go through this complicated procedure more than once—hence no photos of the Earth, which was well out of the field of view.

When the film was used up, the orientation system was automatically switched off, and rotation resumed—presumably to provide enough centrifugal force for development and fixing to be carried out under the equivalent of gravity. Finally, on radioed orders from Earth, the film was moved slowly past the scanning tube and output signals from a photomultiplier were transmitted back to Earth. The maximum scanning rate used gave 1,000 lines per 35 mm frame. The lines show on the reproduced photos, which do not seem to be the same ones used by Lloyd Mallan in his article attacking their authenticity. Definition falls off bady at the edges, as would be expected, and probably accounts for Mallan's "impossible" gulches. The one closeup shown seems to show signs of retouching; an 8-inch lens, operating at f 5.6, and a 20-inch lens at f 9.5 were both used, the first to include the whole disc, the second for closeups.

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The rather sketchy discussion of what the photographs reveal must certainly be based on more than the three we are shown in this advance report. As in most scientific work, results can't meet press deadlines; they wait on systematic study.

A CANTICLE FOR LEIBOWITZ, by Walter M. Miller, Jr. J. P. Lippincott Co., Philadelphia. 1960. 320 pp. $4.95

Here, I suspect, is the Hugo winner as "Best Novel" of 1960, in spite of the five-dollar price. This very price, and the religious theme, have gained it notice in the Sunday and daily book reviews that science fiction almost never gets, and this means that libraries will buy it and fans can read it. They will also remember the three long sections as they appeared in *Fantasy & Science Fiction,* beginning five years ago. So it's a book the voting fans will know about, it's an impressive piece of writing, and I'm betting on it for the award in Seattle in '61.

This is the story of the Dark Ages that will follow our own era of atomic mastery and atomic war, when civilization has been blasted back to scraps and dregs, mutant monsters roam the world as ogres and dragons did after the fall of Rome, and science has been forgotten in a crusade of book-burning. As it once was, the Roman Catholic Church is again the custodian of learning, and in particular the Albertian Order of Leibowitz, founded by a legendary technician, has taken upon itself the duty of preserving the Memorabilia of the forgotten past.

We follow the monks of the Order of Leibowitz through twelve hundred years, visiting them at six-hundred-year intervals. The first and best episode occurs some six hundred years in our future, when a simple novice making his Lenten fast in the desert is led by a strange old pilgrim to discover a true relic of the ancient Leibowitz—an electronic circuit he designed and initialed—and fifteen years later is allowed to witness the canonization of St. Leibowitz in New Rome. This section of the story is gently and humorously told, and its people are warm and real. It can stand by itself, no matter what the final verdict on the whole book may be.

The second episode takes up the story of the Second Western Civilization another six hundred years after the first, in 3174 A.D. Now the empire of the Church and the empire of men are often at loggerheads, and temporal power is gaining sway over spiritual: Hannegan of Texarkana cares very little whether he is excommunicated or not, and the Leibowitz Abbey will make a good strong point in a war against Laredo. But there is a new force working with the spiritual and temporal—the awakening science, represented by Brother Kornhoerr's efforts to reproduce the mechanisms described in the Abbey's treasured documents, and by the theories of Hannegan's young philosopher kinsman, Thon Taddeo. In this era the real struggle is between the

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memories of the Church, which knows how and why Man fell once before, and the visions of the scientist, who knows that Man can and must pull himself up again.

Finally, in the last and shortest episode, still another six hundred years in the future, the wave has reached its trough again and nuclear decimation is sweeping the Earth for a second time, grown out of the fragments of books and papers that Leibowitz hid away more than a thousand years before, and out of the insatiable curiosity of Man. Now, again, Church and State and Science meet head-on: how can the Abbott permit a physician to take the lives of fallout victims, no matter how they are tormented? And how can the Church carry on its ancient trust and preserve the knowledge of Mankind through yet another cycle of history, when there is no longer an Earth capable of sustaining Man?

One powerful note of fantasy ties together the first two sections of the book: the strange figure of old Benjamin, the Jew, the burlap-clad pilgrim who showed Brother Francis the hiding place of Leibowitz' papers, and who is forever peering into the faces of passers-by, to recognize someone who will come again, but never does. Is he the legendary Wandering Jew? Is he Lazarus, brought back from death and now unable to die? Is he an immortal sport like Heinlein's Lazarus Long? Or is he just a crusty old man who has seen a lot and heard a lot? Whoever he is, living among the rocks with his blue-headed goats as the dusty centuries sweep over the Leibowitz Abbey, he is a strong, real, vital figure and good company for the others in this memorable novel.

NIGHT OF THE BIG HEAT, by John Lymington. E. P. Dutton & Co., New York. 1960. 160 pp. $2.95

In this English novel a rather stock situation, and some "explaining" that may not hold water, are made believable by good characterization and relaxed writing.

Richard Cullum, a writer of thrillers, is assuring himself a steady living by running an inn on the Isle of Wight, off the English coast. For a week the sky has been overcast, the heat has been increasing, and there are strange things in the skies and abroad in the night. The heat has everyone on edge, and the situation is not improved when a mystery man who talks to himself behind locked doors, a beautiful but man-hungry secretary, and a wild-sounding science writer all turn up at the inn. At the same moment monsters of some kind start scrambling out of the dark.

The heat and the monsters are the results of a rather nice plot gimmick: that aliens, about to invade a more habitable world via matter transmission, would send test animals ahead as we have sent mice and monkeys into space. That these spiderlike things, pony-sized, happen to eat people, is coincidental; they've been selected for their ability to fend for

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themselves, and getting fed is a first essential. The siege of the White Lion Inn is lifted, and the monsters are destroyed, but the suspense is good and the people are especially well portrayed. We should have more from this writer.

THE ALIENS, by Murray Leinster. Berkley Books, New York. No. G-410. 144 pp. 35¢

The five stories about contacts between men and aliens, collected in this book, are as uniformly good as the same author's recent lot of time-travel tales was trivial. From the Old Master can come just about anything, and you're never sure what it will be.

The title story was here in ASF last August—that excellent problem story of the human ship that makes first contact with an alien race by smashing into them in open space. This is the friendly alien gambit, professionally well done. "Fugitive from Space," on the other hand—from a 1954 *Amazing*—uses the evil alien stereotype, though he is made an evident escaped criminal, quite ruthless in smashing down human road-blocks. I'd say it's the poorest of the five.

"Anthropological Note," from *F&SF*, is my favorite. We are shown the intricacies of an alien Venusian culture through two pairs of eyes, those of a woman anthropologist set down in the village of the maleless females, and those of another ruthless alien—human, this time—who is working on the same problem as the male side. There's humor, sly and overt; there's a puzzle in which the reader is purposely kept a jump ahead of the characters; in short, there's a grand example of what Murray Leinster can do best.

"The Skit-Tree Planet" is a short from a 1947 *Thrilling Wonder*, rather heavily gimmicky, in which the action is kept moving fast to conceal the fact that neither the protagonists nor the reader can possibly figure out what's going on.

The last story, "Thing From the Sky," has been written for this book—at least, it's new here, and it's good. Again the plot is, perhaps, slight and predictable; the details make the story. A Martian spacecraft has let down something like a bathysphere into the desert of the southwest. Its occupant's job is to seed the desert with water-ravenous Martian plants that can grow anywhere and will soon make Earth fit for Martians. A passing airliner cuts the cable, the seeding vessel crashes, the seeds escape, and so does the Martian, with two human hunters close behind.

It doesn't add up to the best Leinster, but it is good average SF of the kind that should make us friends and regain some lost ones.

THE HAUNTED STARS, by Edmond Hamilton. Dodd, Mead & Co., New York; Torquil Books. 1960. 192 pp. $2.95

In thirty-four years of writing, dur-

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ing a good part of which he *was* Mister Galactic Opera himself, you'd think Edmond Hamilton might have run dry. On the contrary, he's writing better and better all the time, and I'm ready to call this his best book until he does a better one.

I like the book especially because some of the old wonder of cosmic spaces, that stood out in those many stories in *Weird Tales,* has here been combined with the reality of good modern writing. Once the launching situation is out of the way—translation of inscriptions found on the Moon—neither the people of the book nor the situations are stereotyped. The more-or-less villain, Air Force veteran Glenn De Witt, becomes more and more understandable as he becomes more and more of a danger to everything the expedition to Ryn, third planet of Altair, is intended to achieve. The seductive alien heroine, instead of turning out to be the stock damsel of the good old days, is a real, tempting, and increasingly annoying individual. Ryn's great Hall of Suns turns out to be exactly what it should and would be, and the shadowy menace from the stars, the ravening Llorn who stopped Man's strides across the galaxy thirty thousand years ago, are the biggest surprise of all.

More, please.

THE REPRINT SHELF

FAHRENHEIT 451, by Ray Bradbury. Ballantine Books No. 382-K. 147 pp. 35¢

A reissue of the reprint of Bradbury's only science-fiction novel.

THE LOST WORLD, by Sir Arthur Conan Doyle. Pyramid Books No. G-514. 192 pp. 35¢

Issued to accompany the forthcoming film. It's still one of the great classics, and presents one of the few real characters of science fiction, Professor George Edward Challenger.

THE THIRD GALAXY READER, edited by H. L. Gold. Perma Books No. M-4172. 235 pp. 35¢

Reprint of the 1958 anthology—a good one.

THE SEX WAR, by Sam Merwin, Jr. Beacon Books No. 284. 160 pp. 35¢

This is Merwin's "The White Widow," published as a Galaxy selection. I haven't compared it with the original to see how much it may have been sexed up, but that is the publisher's avowed policy. The theme is a plot to eliminate men from the Earth and reproduce women by parthenogenesis.

OUT OF THE SILENT PLANET, by C. S. Lewis. Avon Books No. T-410. 159 pp. 35¢

Reissue of Lewis' classic interplanetary novel, which also happens to be the first of his mystic-religious triology, continued in "Perelandra" and "That Hideous Strength."

ROCKETS THROUGH SPACE, by Lester del Rey. Premier Books No. d93. 192 pp. 50¢

An up-dated paperback reprint of del Rey's well done space book for teen-agers. Unfortunately, the fine illustrations of the original are no longer with us.

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BRASS TACKS

Dear Sir:

Your article "The Space-Drive Problem" is the most exciting, to me, of all I have read in a long-long time. Please don't stop now!

Has there been no further development by anyone in private industry or otherwise? Even in Russia?

It is difficult, but possible, to believe the Government could not be interested. Private industry is another matter. If it is all you claim, someone would have to get hold of it if only to protect their own interests.

Please let us know the further developments. You know you have an audience of people with open minds. In my case, I'm a tool and diemaker, you also make my fingers itch to try a few experiments, but I am not sure where to begin. This sounds like a "Damned if you don't" situation.—Oran Zimmerman, 2502 W. 115th Street, Inglewood 4, California.

The September editorial explains what reactions industry has shown.

Dear Mr. Campbell:

I have been following with no little interest the possibility that Mr. Norman L. Dean has just handed us the keys to the solar system. If full-scale utilization of his device is feasible, then it has now become possible to build highly maneuverable flying machines capable of prolonged and intense periods of acceleration.

Now, is it not possible—nay, probable—that somewhere in the universe there are intelligent creatures capable of withstanding far

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more acceleration than mere humans can? The answer is, of course, in the affirmative.

Couple the Dean drive with one of those creatures, and don't you get something called . . . a flying saucer?

Up until this time I had never worried about the flying saucer question. I would still greet most reports of flying saucer sightings with a high amount of skepticism, but . . . I am no longer able to ignore the possibility that Somebody Out There May Be Watching Us.

And if somebody out there IS watching us—well, then, they probably find it most difficult to like what they see. The record of mankind is often not a pretty one. Hiroshima made it quite a bit uglier. Is there any race that would *welcome* the spreading of our inability to get along to the stars?

This is not to suggest that we should ignore the Dean drive as a wonderful tool for space flight. But if we go leaping out into space with the cocksure conceit that nothing can hurt *us,* we could easily trip and fall flat on our collective face. This possibility can not, must not, be ignored. It would be wise if the first spacemen we send out are men capable of handling as successfully as possible our first contact with an alien culture, as the wrong kind of contact could easily mean extinction for us. (Maybe we should send Eric Frank Russell as an expert on how to deal with alien races.)

You might suggest in one of your next editorials that there is a right way and a wrong way to enter space. Certainly there can be no harm in tempering our boundless enthusiasm to see space conquered with a little wisdom and forethought. You agree? —Steven Johnson, 6655 MacArthur Boulevard, Washington 16, D. C.

Adults consider childish behavior appalling—in an adult. In children, we tolerate what we know will pass.

Dear John:

I read your article on the Dean Drive and was mildly horrified at the idea but not so much as a physicist might be. One thing a mathematician learns if he hasn't had too much training in physics is an utter contempt for theories. A good mathematician can prove anything he wants to prove by the simple expedient of buggering around with his basic axioms. A physicist could go to the bughouse by the overthrowing of Newton's laws, but not a mathematician. The mathematician would be much more blasé about it all because he wouldn't have to change his world view at all. "We're still here, we still know how to build radios, atomic reactors, cars, rockets, et cetera," he would say, "so let's just cook up a new set of axioms and rules of inference and see if we can't get another model which explains things." Then we can train a new generation of physicists and let the old ones die off in their padded cells. The poor lowly physicists don't un-

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derstand what is self-evident to the meanest pure mathematician: there are no "truths" at the basis of our understanding of the universe, only arbitrary axioms picked out of a hat because they looked pretty to some joker. There is aesthetics at the bottom of it all, not truth or reason or fact. You can even prove mathematically, via a Turing machine, that any physicist with a fixed and unchanging set of basic axioms cannot be creative, i.e., you can prove that there exist relationships outside his system which he can never discover. In essence you can show mathematically that no specific set of consistent axioms and rules of inference can describe everything worth describing. The "creative genius," the man who can perform creative acts on a level higher than that of a Turing machine *must* pass through a stage where his world picture contains inconsistencies. This is a mathematical fact, a law out of modern logic. A theoretical physicist with a nice neat set of basic principles is a clerk. If he can't learn to chase things along some idiotic, goofball tangent he'll never make the top ranks. Cold hard metamathematics says so.

With that aside I'd like to comment on the Dean Drive. Assume that it works. Actually that's all a mathematician needs to cook up a theory which explains it adequately. It's irrelevant whether it really works or not. A good pure mathematician doesn't give a damn about reality. Leave that to the mundane physicists.

You say the Dean Drive "generates a one-way force; it lifts if you point up, but it pushes in any desired direction, without need of something to take the reactive force." But you show an experiment which demonstrates vertical thrust only. Whether it can produce a pure horizontal thrust or not is a very critical question. If it can, then it is independent of the gravitic field in which it lies, in which case it is a space drive. If it cannot produce a pure horizontal thrust, however, it is an antigravity device. Preferably it should be incapable of horizontal thrust, not because a space drive wouldn't be more convenient, but because under this assumption we can perform the maximum conservation of Newtonian mechanics. If the Dean Drive was capable of horizontal thrust, it would take some pretty ghastly revisions of physical theory on the order of what happened after the Michelson and Morley experiments. On the other hand an antigravity device does not need to violate the action-reaction law. Working inside a gravitic field it can thrust down on the mass which is generating the field. Angular momentum, momentum, mass and energy are conserved and everything is pretty nice.

Of course, then the device is useless for horizontal motion on Earth, and airplanes equipped with the Dean Drive would have to maneuver much as a sailboat that wants to move cross-wind all the time, and it would not function in an equipotential gravitic field. Still it would be awfully useful to a rocket spaceship

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not to have to fire its rockets until it was fifty thousand miles up or so. The mass-ratio problem would be a thing of the past.

By the way, there have been persistent rumors in the last three or four years about the existence of some hush-hush high security antigravity project in the States. Nobody takes them seriously but the rumors don't die out, either. I was thinking that it would be a very amusing joke if one part of the bureaucracy had stumbled onto antigravity and was keeping it a hush-hush top priority program while another part of the bureaucracy stumbled onto the same thing and casually and scornfully published it for the entire world to buy at twenty-five cents.—Donald Kingsbury, Montreal, P. Q., Canada.

A delightful dissertation on the mathematician vs. the physicist!

And—the Dean drive works horizontally. Suspended from a flexible wire, the model will push itself away from the vertical and hang at an angle.

Dear Mr. Campbell:

I read your article on "The Space-Drive Problem" in the June issue of your magazine. I confess that I was not sharp enough to follow the text and understand exactly how the device of Dean's worked. However, I believe I am sharp enough to know that anything of as much significance as that should not be summarily dismissed just because it refutes what is in the books. I once heard Charles Kettering say there should be signs over the doors of all libraries, "Enter at your own risk" because there is so much misinformation inside.

My Ph.D. is in science, not in engineering. The November, 1958, issue of *Harper's* carried an article about "Scientists with half-closed minds." However, I still think I prefer to be classed with that group than with engineers whose minds appear to be hermetically sealed against anything new. I have been working in "housing research" for more than two years and the astounding part is how difficult it is to get acceptance of a new idea. Someone has said that resistance to new ideas increases with the square of their value.

About two years ago I proposed a new floor construction and heating system for on-grade or basementless houses. My tests, all done at home and on my own time, indicated the system would work, but my superiors insisted it wouldn't and that if I chose to try it I would have to do so on my own time and at my own expense. I borrowed the money and gambled $24,000 on a house to prove I was right. The editor of *House & Home* said of my system that it would "Save $300 per house." I believe the device which makes this system practical will be on the market soon.

Along the same line, the director of research of Timber Engineering Company, a branch of the enormous National Lumber Manufacturers As-

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sociation, commented on the fact that they had seen fit to close their research laboratory. The reason he gave was that for every engineer who would express a willingness to accept and try new ideas, there were ninety-nine who right off hand would say, "It can't be done." A research laboratory cannot function with that kind of personnel.

Since your magazine has "Fiction" in its name, a quotation from literary fiction may be of interest to you. On page 114 of the paperback copy of John Steinbeck's book "East of Eden" you will find this quotation:

"Our species is the only creative species, and it has only one creative instrument, the individual mind and spirit of a man. Nothing was ever created by two men. There are no good collaborations, whether in music, in art, in poetry, in mathematics, in philosophy. Once the miracle of creation has taken place, the group can build and extend it, but the group never invents anything. The preciousness lies in the lonely mind of a man.

"And now the forces marshaled around the concept of the group have declared a war of extermination on that preciousness, the mind of man. By disparagement, by starvation, by repressions, forced direction, and the stunning hammer-blows of conditioning, the free roving mind is being pursued, roped, blunted, drugged. It is a sad suicidal course our species seems to have taken."

Steinbeck certainly knew what he was writing about. I hope you will keep up your good work, because if you and others like you do not, the future of our nation looks very dim. —G. J. Stout.

The trouble is, the creative man likes *to think, and his results force other people to think whether they like it or not.*

Dear John:

This letter is a reaction to your issue of June 1960—mainly to your editorial and to your article on Mr. Dean's gadget.

First, as to your editorial. I'm no mathematician—thermodynamics, for which you need only the ability to count on your fingers, is about my limit—but I have one beef to register. The function which you list—correctly—as describing distance traveled under constant acceleration as a function of time, is *not*, repeat *not*, an exponential. It is a simple quadratic, which is an entirely different animal. They aren't even in the same ball park—as doubtless five thousand readers have already remarked.

Second, as to the Dean article. It is not quite accurate to state that no governmental agency or agent thereof has examined Dean's widget. (A gadget that moves.) I work for the United States Naval Air Rocket Test Station, as head of the propellants division. It is my business, as I have interpreted it, to know about everything that is happening in the propulsion field. So when I was in Washington on some sort of business, I made a

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point of calling on Mr. Dean, and of examining the machine. (Incidentally, when you count the tip, the taxi costs seventy-five cents, and not fifty.) And I saw exactly what you did when he turned the thing on. My first recorded remark when it happened was; "I'll be a . . .!" and the second, some ten seconds later, was, "For God's sake give me a drink!" He did, too, with promptitude—Canadian Club.

Anyhow. I invited Mr. Dean up to NARTS, and he came, and demonstrated the machine before the Exec, the Engineering Officer, the Chief Engineer, a couple of Project Engineers, and myself again. And it did the same thing all over again. We were all interested—fascinated, in fact—but we had no authorization to go into the matter—Washington was busy with matters of reorganization or *something*—and we had to let the matter drop.

The one point of criticism of the validity of the experiment was that the mass of the bathroom scale seemed to be necessary to produce the phenomenon. Hence there was a hint of some sort of reaction, a la Newton. I think that a simple modification of the setup should settle that once and for all. Set the bathroom scale on top of another one—with no connection between them—and see if the lower one shows a drop in apparent weight. Or just tie the gadget to a fifteen or twenty pound hunk of steel instead of to a scale, and set this chunk, with no connection, on a scale.

I don't know whether the effect is real—or whether there is a flaw in the test setup. But it sure ought to be investigated. And that shouldn't be too tough.

As for your remarks about the horsepower of a rocket, I think that you're barking up the wrong tree—Karl van Kempen come again to bother everybody. Kinetic energy is a messy function—and you have to be extremely sure of what you're talking about. When you define the kinetic energy of a moving body—or any body, since it *must* be moving relative to something—as the energy which must be applied to said body to bring it to rest *relative to your particular point of reference* all difficulties vanish. I have a lot of kinetic energy relative to the Moon, but none at all relative to this typewriter. That is not a flaw in our mathematics, but a result of sloppy definitions. The kinetic energy of a rocket is naturally different, when related to the moon, than when related to the Earth. You naturally have to put a different amount of braking energy into effect to bring your car to rest relative to an express train than you have to use to bring it to rest relative to the cop who objected to the first experiment!

As for the horsepower of a rocket, people have asked me that so many times that I had to work it out in self-defense. The simplest way to do it is to define it as the rate of production of kinetic energy in the exhaust stream *relative to the rocket itself*. This comes out:

$$HP = F \times I_{sp}/34.17$$

HP is obvious, F is the thrust of the

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rocket in pounds, I_{sp} is the specific impulse in seconds, or the thrust divided by the consumption of propellants per second, in consistent units, and the 34.17 underneath is a catchall which includes all the conversion figures. For instance, if the thrust were 50,000 pounds, and I_{sp} 250 seconds —typical for the propellant combinations of the big birds—the horsepower would be 50,000 x 250, all divided by 34.17. Work it out yourself—it's quite impressive. Here horsepower is merely the rate of conversion of chemical energy to kinetic energy in the exhaust stream.

Incidentally, I plugged Dean's figures on the thrust he could get per horsepower back into this equation, just to see what would happen, and came up with a specific impulse which was very close to unity. What this means, if anything, I don't know. But it comes out too pat for a coincidence, and it's got me walking around in circles.

As for your conservation of energy relative to the Earth or relative to Mars, I would suggest that you include in your computations the kinetic energy of the exhaust gas—that cost money, too. I think that if you do that, a rigorous calculation will show that the total kinetic energy, from either viewpoint, will be conserved.

I personally do not see that the laws of thermodynamics are involved in the apparent breakdown of Newton's third law. The first law of thermodynamics merely states that you don't get something from nothing, and Dean makes no claim to a perpetual motion machine or anything like it. He merely has a device—if he has—which puts all of your energy into the vehicle instead of wasting most of it in an exhaust stream.

One more remark, before I quit. Sure, we can't solve the three or n body relationship mathematically and exactly—any more than we can get the value of π that way. But put a 704 on the job and let it grind away for a week or so and you'll have a result that's good for the next billion years or so. And when that time comes around we can put a 705 on the job. Do you want an egg in your beer?—Dr. John D. Clark.

1. *Dr. Clark did investigate the Dean device, as he states—but not until he was made aware of it through the December 1959 editorial. No government agent investigated before the patent was published.*

And—typical of governmental snafu—even though the engineering group found it decidedly worthy of further research, there was no way to get the authorization to do so.

On that kinetic energy problem: Let me make the definitions just the way I want them, and agree to follow my definitions, and no others, and I'll prove black is white.

It always makes me a little suspicious, uncomfortable, when something is claimed as a Universal Law—but requires very narrow and exacting definitions before the Universal Law holds.

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(Continued from page 7)

If you don't like the result of logical application of your postulate—go back, and reword it so that it doesn't take someone with six to sixty generations of training in Sound Intuition to interpret it. Word it so that a logician, or a robot, can apply it logically, and get a rational result.

But you'll never be able to fix up the first two postulates until you throw out that stinker #3. Number 3 says, in literal interpretation, that *there cannot be any government officers.* An officer is an individual having superior powers; he isn't equal to other men.

Meanwhile, the various Congolese tribes are happily going back to the freedom to hack each other up; that's the way they want to live and act, and now they have a free right to do so. There's a slight difficulty, however, since one of the tribal groups was, before the Whites took over, serfs of another tribal group. This introduces the complication that the ex-Masters are being interfered with in their desire to live and act the way they choose to—i.e., to resume their way of life of being Masters. The ex-Serfs, having been assured that they are now free men, choose to live and act in a manner that satisfies them—repaying the ex-Masters for past insults.

And all this, be it noted, is the logical, literal-minded consequence of the postulates that they have been solemnly assured are the true basic postulates of popular democracy.

Of course, in addition there have been minor things like happily shooting up carloads of Whites who were thick-witted enough to fail to predict what was going to happen, and left too late.

The Negro government leaders are perfectly helpless, because Postulate #2 made their police force nonfunctional. The Whites are equally helpless, because the political axiom that no foreign power has a right to interfere with the domestic affairs of a sovereign power blocks them.

As of this writing, the United States is being asked to make another Big Help play; United States troops are wanted to suppress the Congolese people, on behalf of the Congolese government. It might not leave the Congolese people with quite such a solid future anger against the United States if the troops could have been made up of an all-Negro division. Otherwise, the Congolese would observe that United States Whites were seeking to take from them their newfound freedom to live their lives in the way they choose. Happily, the United States declined to get sucked in to that one.

Anybody around doubt that the Congolese people *really* weren't ready for self-government? Or, at least, self-government was not adequately defined as to be ready for them.

What they will get, in the course of a couple of years when things gradually settle into a working, workable system, is a good, solid aristocracy.

The oldest of the African Negro

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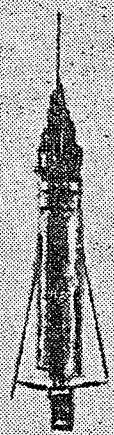
republics—Liberia—was originally established by freed slaves from the United States; it is, and for most of a century has been, a fairly stable, going, workable government. It is, however, a democracy on the Athenian model—a few thousand voting citizens, with the vast majority of the population not considered fit to vote.

Until someone cracks the problem of teaching Intuition, it's utterly impossible to build a government on literal-minded logical—but injudicious—people.

There's going to be a lot of unnecessary bloodshed along the way. The literal-minded Congolese who have been taught those misstated postulates, and have believed them sincerely, cannot be un-taught half as easily as they were taught. It's very difficult to get a man who knows he now has a proper right to rape and murder if he chooses to live and act that way, to yield that highly satisfying right.

He'll be fighting for his rights and his freedom. Just ask him! Didn't you say that a free man has a right to make up his mind for himself as to how he shall live and act?

Next time, before handing out noble-sounding postulates to literal-minded logicians . . . do a little more careful job of defining what you mean. And you'd better exclude the sob-sister sentimentalists from your discussion, too. There's a kind of fruitcake postulate they've grafted on our own society that represents another lovely irrationality for the literal-minded logician type.



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There's a specific case I've heard of, a woman about thirty years old, who has so far produced seven illegitimate children, and has quite a number of years in the child-bearing ages yet to go. The children were fathered by six different men. The state Welfare Department is currently paying her more in welfare money than it is paying the Welfare Department worker who works for her living by handling the case.

This "case" has found a fundamental fact of the present culture; the state in this specific instance, California, does in fact employ her, since it is paying her to produce illegitimate children, with a fixed and guaranteed bonus for every additional illegitimate baby she produces. Since she can produce about one a year, this assures her of a guaranteed annual wage increase—so long as she continues to refrain from getting married. If she made that mistake, of course, her husband would become responsible, and the state would no longer pay her to produce bastards.

And that, my friends, is the literal-minded logical consequence of the state's sob-sister Welfare laws. The Welfare Department workers, who work for a living, are not guaranteed any such cozy annual wage increases . . . unless they are unmarried, female, quit working for a living, and produce an annual bastard.

Incidentally, the Welfare Department has repeatedly tried to get the state legislature to change the laws. In a sentimental, but fantastically senseless, popular democracy reaction, the legislature repeatedly failed to do so.

Notice that that "case" mentioned above has correctly—*not* incorrectly—deduced the actual logical consequences of her state's Welfare laws. The sentimentalists who framed the laws did the usual sentimentalist's sloppy job of extremely poor definition of postulates. It wasn't their intention to set up the state in the business of hiring women to produce illegitimate babies; what their intention was has, however, no bearing on the fact that they did in fact do just that.

Of course, it takes a medium-grade moron to be that literal-mindedly logical . . . but the nation has a liberal supply of those, of course. And certainly a medium-grade moron can't find any other business that she can carry out with such perfect success that yields a guaranteed annual income higher than that of a college-trained social service worker.

That woman may be stupid—but she's no fool. The social service worker handling her case is, and she knows it.

The Editor.

★ ★ ★

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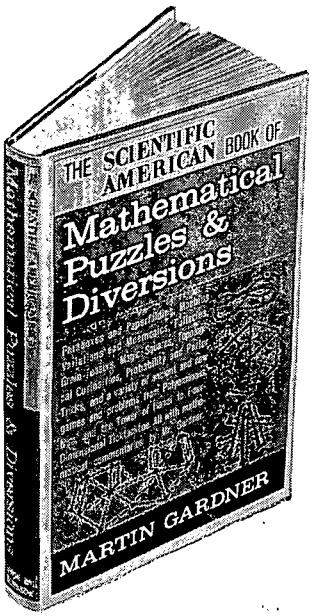

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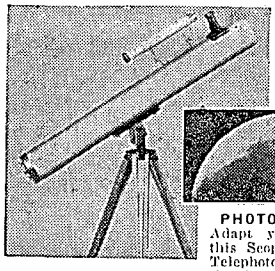

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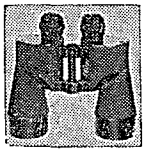

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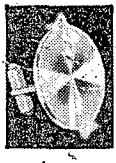

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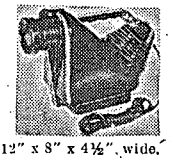

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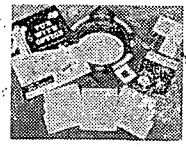

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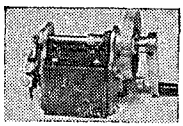

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